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WILDLIFE IN NORTH CAROLINA

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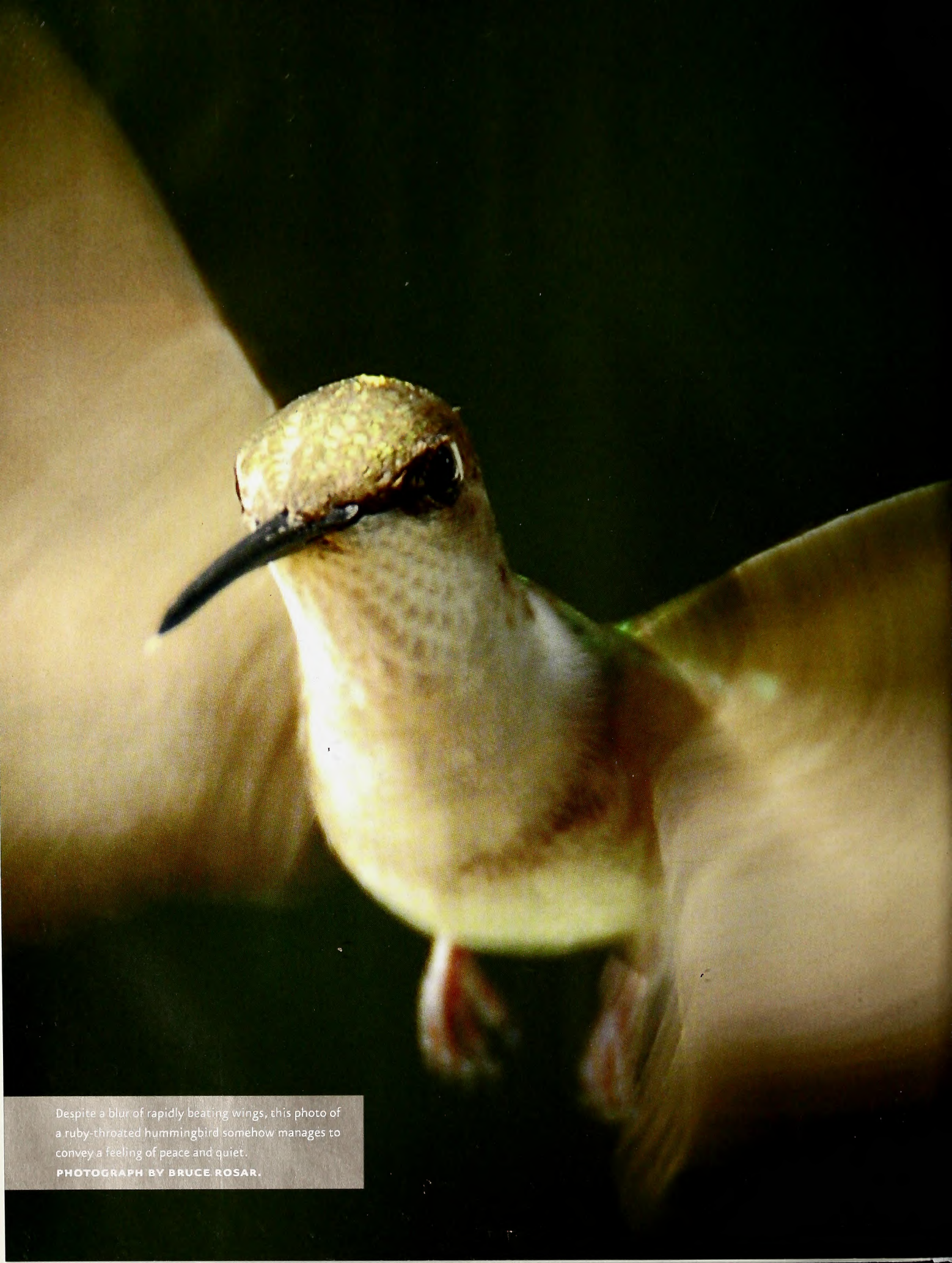
WILDLIFE IN NORTH CAROLINA
2006 PHOTO COMPETITION



Despite a blur of rapidly beating wings, this photo of a ruby-throated hummingbird somehow manages to convey a feeling of peace and quiet.
PHOTOGRAPH BY BRUCE ROSAR.

Volume 71 | Number 1

WILDLIFE IN NORTH CAROLINA

contents | january 2007

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Cover: Rarely seen on land but common in the Gulf Stream during summer, the Wilson's storm petrel was a winning subject in the magazine's 2006 photo competition. PHOTOGRAPH BY NATE BACHELER.

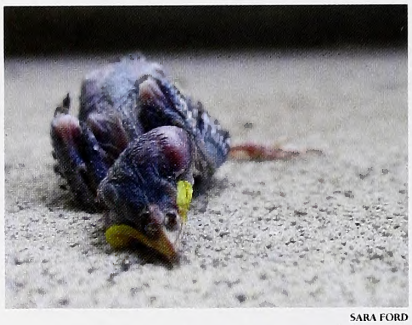
Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

It is doggone tough to win the *Wildlife in North Carolina* Photo Competition. With more than 5,000 entries and only 31 prizes to give out, your image really has to stand out to be noticed. Because it is so difficult to judge such a huge number of really good entries, judging took a brutal 11 hours this year—half again as long as 2005.

Once the smoke cleared, what remained was a phenomenal collection of winning photos and dozens of excellent pictures that did not win. Here are a few factors the judges considered that elevated our winners above the rest:

Uniqueness: An image that hasn't been seen many times before tends to grab the eye. A lot of people have seen a black-crowned night heron squatting on a coastal pier piling, wings tucked up tight, but Kirk Pullen's photo of this heron landing on a dead tree gave us a rare view of this bird with wings spread wide and legs fully extended.



SARA FORD

Extreme macro: Getting a close-up view of an animal is highly appealing. Paul Wagner's mating fruit flies, Patrick Chipley's jumping spider and Mark McDermott's alligator eye each take us closer than we ever thought we could get to these creatures. This also works well with plants such as Nate Bacheler's maple leaves and Hobart Jones' dandelion.

Action/personality: Bacheler's running Carrot Island horse conveys poetry in motion, while Ed Ziegler's angry gull looks every bit the fighter it is. You can almost feel the splashing water from Charles Twine's bathing cardinal. Lori Cash's peeking deer, Twine's bear cub, Anna Gass' toad and Mark Kostich's hatching skinks are each packed with personality.

Feeling: One of my favorites among this year's entries was youth photographer Sara Ford's photo of a dying baby bird that had fallen from its nest. The photo was not chosen as a winner, but I love the statement it makes. Sara's camera angle—lying on the ground to get the shot—creates a stark image that illustrates how harsh nature often is. Creating a work of beauty from one of the natural world's ugly moments—to me, that's a true photographic achievement.

Greg Jenkins

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JANUARY 2007 VOLUME 71, NUMBER 1

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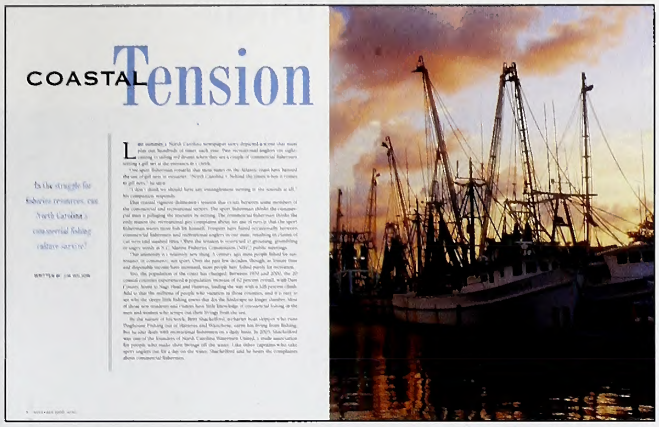

Tense Comments

As I read "Coastal Tension" (Nov. 2006) today, I couldn't help but think about the day last July I walked out of the Sanitary Fish Market and Restaurant in Morehead City and onto the docks just in time to see professional hockey's Stanley Cup cruise by in a tiny Carolina skiff. Things are much different now than they were 40 years ago on the waterfront.

Could it simply be that we are entering a change that will render the 300-year-old commercial fishing industry in North Carolina obsolete? Very few industries last 300 years. That's a heckuva run. An increasing pace of change is a fact, and no one person or group has caused that or can change it.

The future could look something like this: Many hardworking fishermen retire in grand style due to the whopping value of their real estate. The local economy booms as sport fishing improves, and the N.C. coast competes even more successfully with other coastal states for fishing and tourist dollars. Restaurateurs and their customers revel in less expensive seafood from other sources. A small but successful remnant "boutique" industry remains, with fresh N.C. seafood as a premium product. The coastal tension goes away because everybody is a winner.

I can't say that would happen or that the time is right for it. But it's plausible. Change happens.

Chuck Wright
Raleigh

A key issue missing from Jim Wilson's otherwise thorough feature on coastal fisheries management is best use. No one laments today laws passed in the early 20th century to prohibit nets in our lakes and streams. The public gradually reached accord that using such public trust resources as largemouth bass only recreationally was a better use for everyone collectively than allowing them to be sold.

If a law like the 1997 Fisheries Reform Act, which prohibits management for best use, had been in effect then in fresh water, commercial fishing would have prohibited the monumental benefits recreational bass fishing has brought this state for over a century.

Of course, some commercial netters of the day were economically deprived by the policy shift that ensued. Maybe they should have been compensated. Maybe modern-day netters should be compensated for disposing of their saltwater nets when the time comes.

That early 20th-century policy shift toward recreational use generated disputes similar to those that rage today over the issue in brackish and salt water. The important point remains best use in terms of generating the greatest public benefit. Managing any resource as welfare to prop up a fading social structure under the guise of cultural diversity will only deprive us of the best use of our fisheries.

Joel Arrington
Oriental

I enjoyed Jim Wilson's informative article "Coastal Tension." It gave an excellent picture of both sides of the marine fisheries management puzzle. As a lifetime saltwater fisherman in the Pamlico area, I have seen fish populations ebb and flow due to various factors: Water quality, weather, runoff, fishing practices, regulations, oxygen levels and red tides all have major impacts on what bites the hook in any given year. We have improved many of these areas, but still have work to do. I am also supportive to the plight of the commercial fisherman, but only to the degree that they are responsible stewards of the resource.

The following practices lead many to question the commercial sector's concern for the resource: 1. Massive numbers of crab pots in inland waters, each filled with oxygen depleting, rotting bait. 2. Thousands of juvenile finfish discarded as trawler bycatch. 3. Gill netters targeting sensitive areas and/or locations where large concentrations of specific fish congregate after or prior to migration. 4. Large numbers of trawlers in our inland waters, often from other states.

In contrast to the commercial interest, the recreational community has routinely supported limitations which improve stocks. Since the referenced changes have been implemented in states such as Texas and Florida, there is no denying the improvement in the health of the resource. This is evidenced by bent rods, full motels and restaurants, happy guides and increased tourism.

The argument of occupation vs. recreation no longer holds water. Tourism, boat builders, marina operators and others also have a significant economic interest and employees and families to feed. The resource indeed belongs to us and our children, not one particular user group. It should be managed for water quality and healthy fish stocks. Our heritage and the long-term economics of the region depend on it.

Ritch Haar
Raleigh

Jim Wilson is to be commended for his informative and interesting articles on marine fisheries ("License to Manage," Oct. 2006, and "Coastal Tension"). He did a masterful job of explaining changes over time, coastal developmental pressures and the need for recent legislation. The potential effects on fish stocks, resource utilization and people's livelihoods were explained with sensitivity and by providing different perspectives. He did a great job of objectively reporting on an important issue.

F. Eugene Hester
Springfield, Va.

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WILDLIFE IN NORTH CAROLINA 2006 PHOTO COMPETITION

Nate Bacheler's dominance in the *Wildlife in North Carolina* 2006 Photo Competition is somewhat of a good news/bad news situation. The bad news is that he might not need the zoology Ph.D. he is working on through N.C. State University. The good news is that the reason he might not need a doctorate is because he is an excellent photographer.

Bacheler, who won two second-place awards in last year's competition, cleaned house this year with five awards, including the grand prize, first place in Wild Plants, and third place in Mammals, Invertebrates and Outdoor Recreation. He also earned an honorable mention in Peaks, Valleys and Plains.

Part of Bacheler's secret is to live in beautiful Morehead City, close to lots of other scenic places such as Croatan National Forest and Carrot Island. But the key is to get outdoors often and take lots of pictures. His winning photos span the state from Great Smoky Mountains National Park to the Gulf Stream, where Bacheler captured his grand prize photo of a Wilson's storm petrel from a boat off the coast of Hatteras. The picture combines the whimsical action of the bird's feeding behavior—skipping across the water and scooping up food—and the fluid beauty of the warm blue water.

In the second year the competition has been held, 1,008 photographers entered a total of 5,133 photographs. The competition is intended to encourage high-quality nature photography and to identify talented wildlife photographers working in North Carolina. More than 140 young photographers entered in the two youth categories, more than double last year's number. The most popular subject was Invertebrates (893 entries), followed closely by Birds (826) and the landscape category, Peaks, Valleys and Plains (762).

Our top-notch judges included *Wildlife in North Carolina* art director Vickie Cumbee; *WINC* photographer Melissa McGaw; educator Mike Dunn, coordinator of teacher education for the N.C. Museum of Natural Sciences; marine biologist and professional wildlife photographer Todd Pusser, a 2005 category winner in the prestigious *BBC Wildlife Magazine* Photographer of the Year competition; and John Hansen, the photo editor for the features section of *The News & Observer* of Raleigh.

We wish to thank our corporate sponsors, Great Outdoor Provision Co. and J.W. Photo Labs of Raleigh, for their generous participation in this year's competition. Valuable support was provided by our co-sponsor, the N.C. Museum of Natural Sciences. All winning photographs may be seen on exhibit through March at the museum. Details on the 2007 competition will be posted on www.ncwildlife.org in May, and entries will open on June 1.

—Greg Jenkins

GRAND PRIZE WILDLIFE IN NORTH CAROLINA 2006 PHOTO COMPETITION

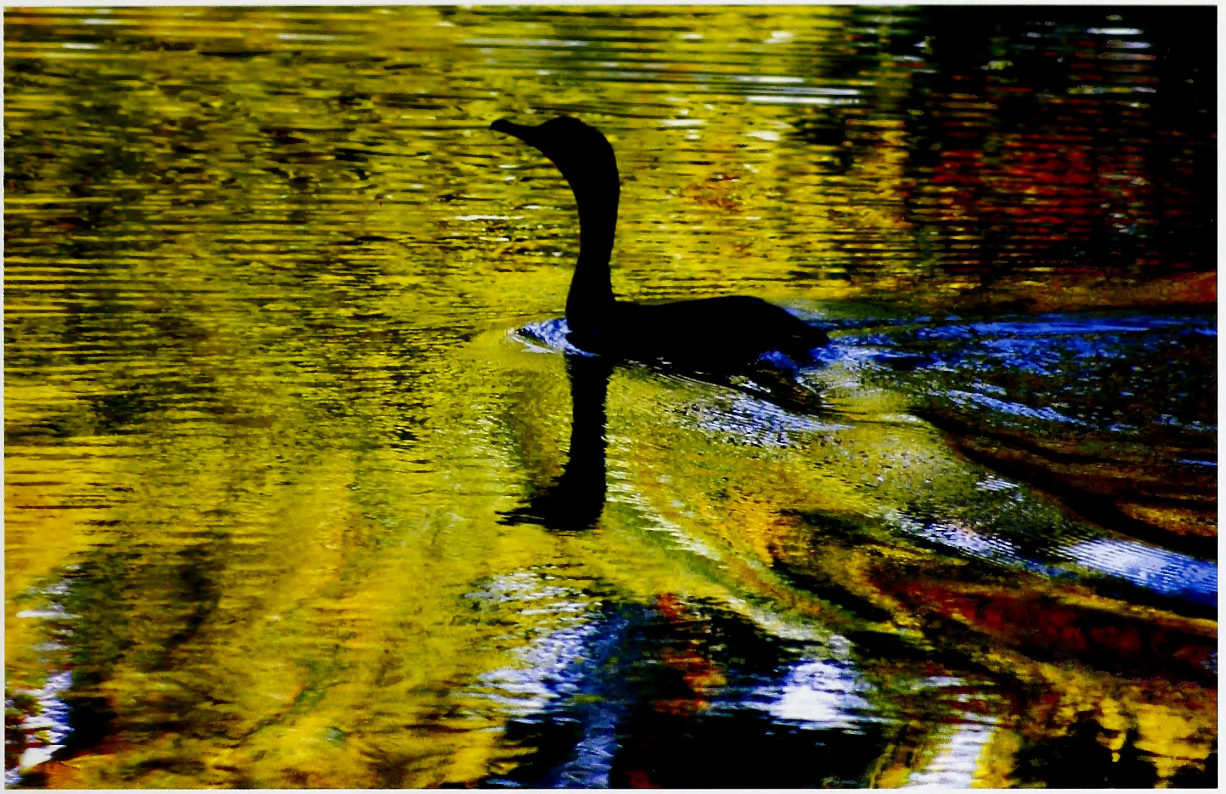
Nate Bacheler, Morehead City
Wilson's storm petrel, Gulf Stream off Hatteras

In June 2006, Bacheler was serving as a trip leader for Brian Patteson, who takes birders offshore to see pelagic species such as this petrel. Chumming behind the boat attracted this bird close enough to for Bacheler to capture droplets as the petrel skipped across the water, feeding on the chum.

BIRDS **FIRST PLACE**

Kirk Pullen, Warsaw
Black-crowned night heron, Buxton

Pullen, a teacher in Warsaw, captured the attention of the judges with this unusual photo of a black-crowned night heron landing in the top a dead tree near Cape Hatteras Lighthouse. Pullen is relatively new to photography, having "really gotten into it over the past year" after buying a new camera. The purchase was necessitated when his young son broke the less expensive model he had been using.



BIRDS **SECOND PLACE**

Regina Jo Chayer, Garner
Cormorant, Carolina Beach

Thayer took up photography as "something to get me out of the house." She spied this cormorant early one morning on a lagoon near the beach. "I was just in the right place at the right time," she said.

BIRDS **THIRD PLACE**

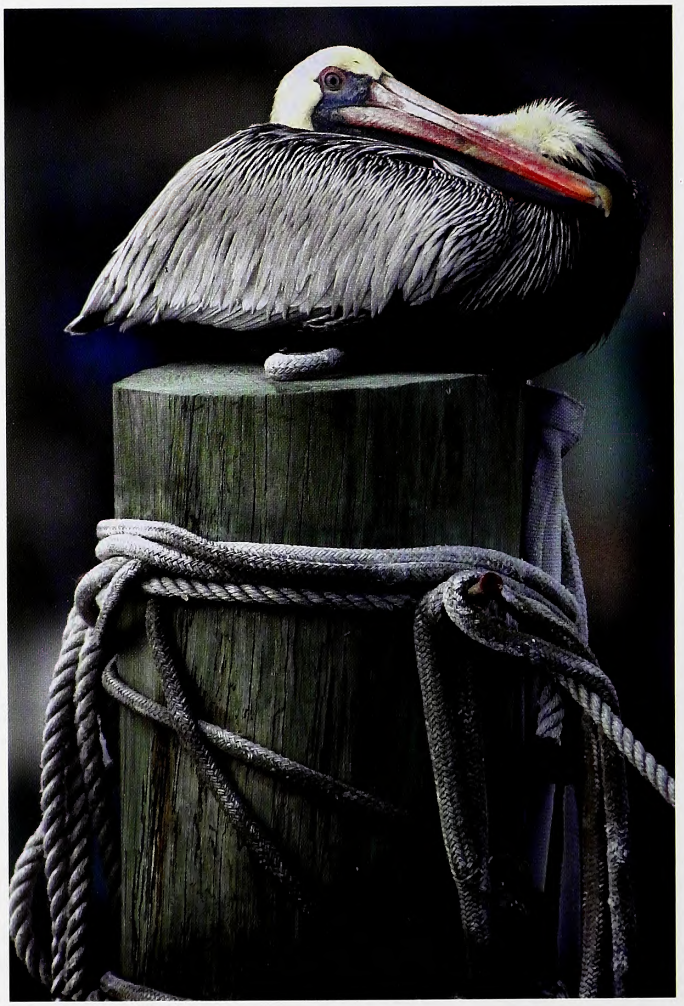
Ed Ziegler, Raleigh
Ring-billed gull, Nags Head

While at Nags Head for the weekend, Ziegler noticed a lone gull calmly walking on the beach. When another gull appeared, Ziegler's subject took offense and began attacking the other bird. That's when Ziegler snapped his photo. "I'm not sure why he reacted that way," Ziegler said.

BIRDS **HONORABLE MENTION**

Ed Erkes, Goldsboro
Great crested flycatcher, Wayne County

Erkes used his skill with high-speed photography to snap this dramatic shot of a great crested flycatcher, which breeds in North Carolina during the summer. "I used the same setup as I would for shooting a hummingbird—high-speed flash, painted poster board and infrared beam," Erkes said.



BIRDS **HONORABLE MENTION**

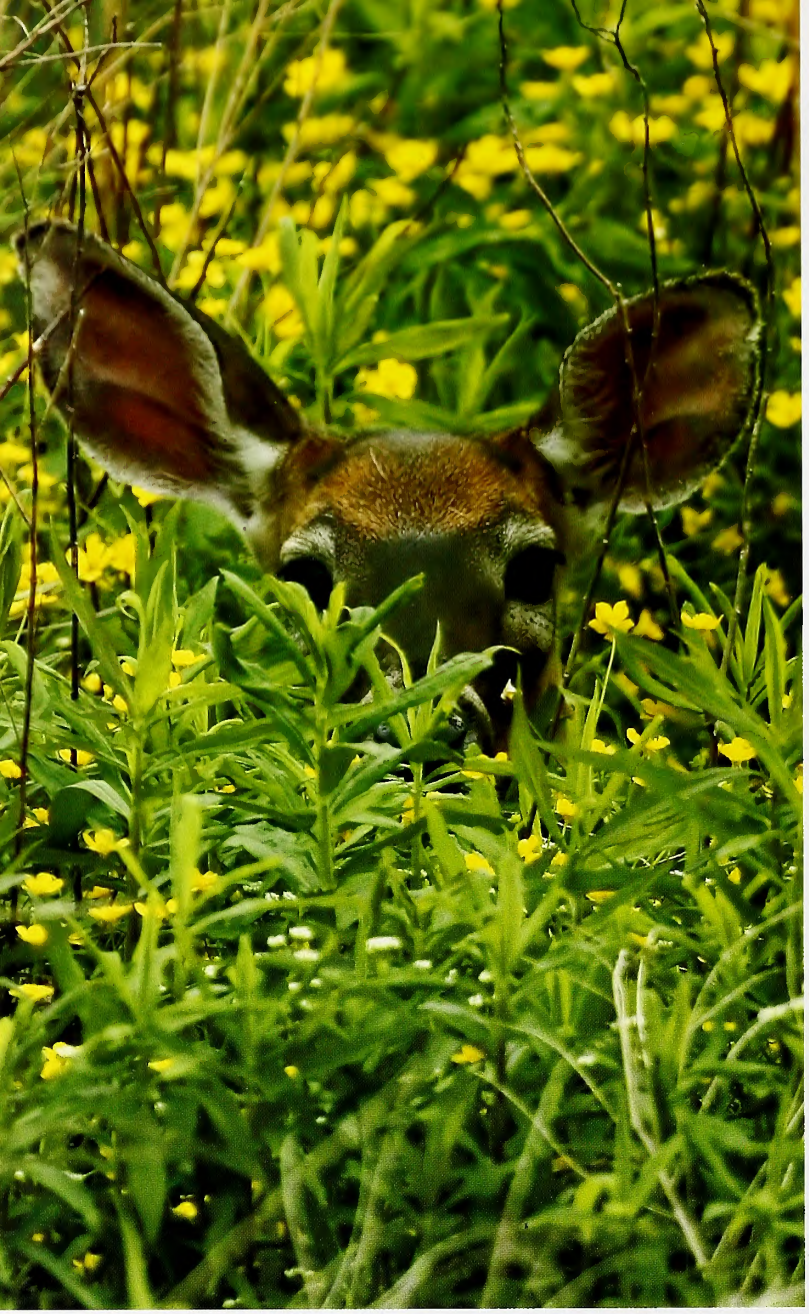
Gene Furr, Raleigh
Brown pelican, Carolina Beach

While walking about and not finding much to photograph, Furr noticed this pelican hunkered down on a piling about 5:30 in the afternoon. "The fishing boats were starting to come in, and I think he was just waiting for a meal," Furr said.

MAMMALS **FIRST PLACE**

Hazel Erikson, Sharps Chapel, Tenn.
Elk, Cataloochee Valley

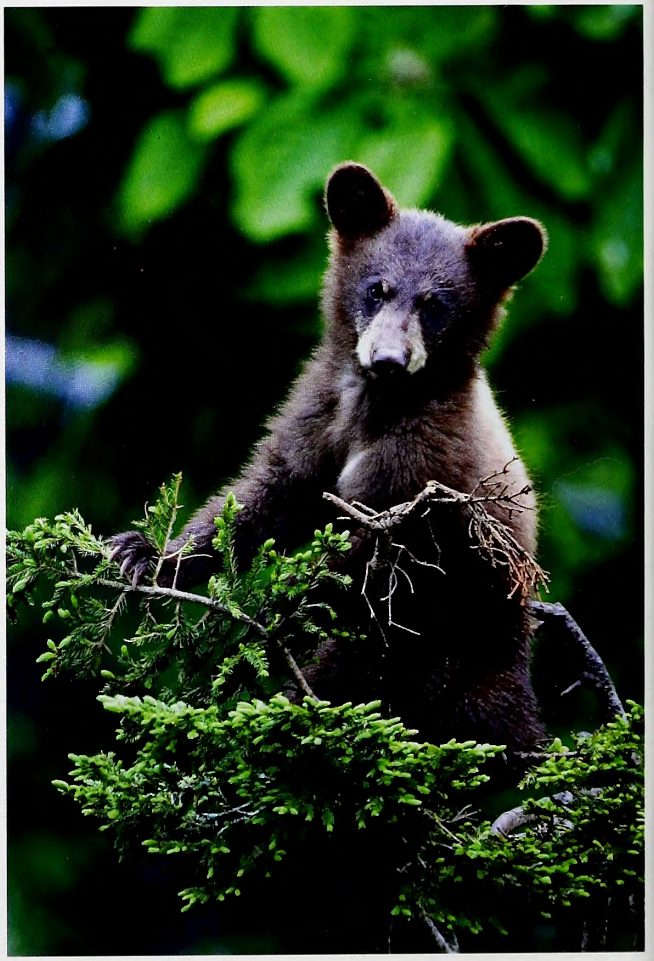
Erikson was out with her camera club at dawn when she photographed this elk having breakfast. Golden morning light illuminates the scene perfectly, and a fortuitous turn of the head hides the tracking collar and ear tag the bull was wearing.



MAMMALS **SECOND PLACE**

Lori Cash, Grandy
Deer, Alligator River National Wildlife Refuge

Cash spends a lot of time in the numerous wildlife refuges located in the northeastern corner of the state. She liked that this photo contains only the two most compelling parts of this young deer's face—its seemingly oversized eyes and ears.



MAMMALS **HONORABLE MENTION**

Charles Twine, Chapel Hill
Black bear cub, Grandfather Mountain

This perfectly posed cub in a hemlock tree made for a wonderful portrait by Twine.

MAMMALS **THIRD PLACE**

Nate Bacheler, Morehead City
Running horse, Carrot Island

Bacheler was out photographing insects when this wild young pony came running past him. Unsure whether it was threatening him or just having fun, he was able to click off three frames as it dashed by at full speed.

MAMMALS **HONORABLE MENTION**

Gary Carter, McLeansville
Cotton rat, McLeansville

Carter is a firm believer that you don't have to travel far to find interesting subjects to photograph, as his shot of a common cotton rat taken in his back yard shows.

REPTILES & AMPHIBIANS **FIRST PLACE**

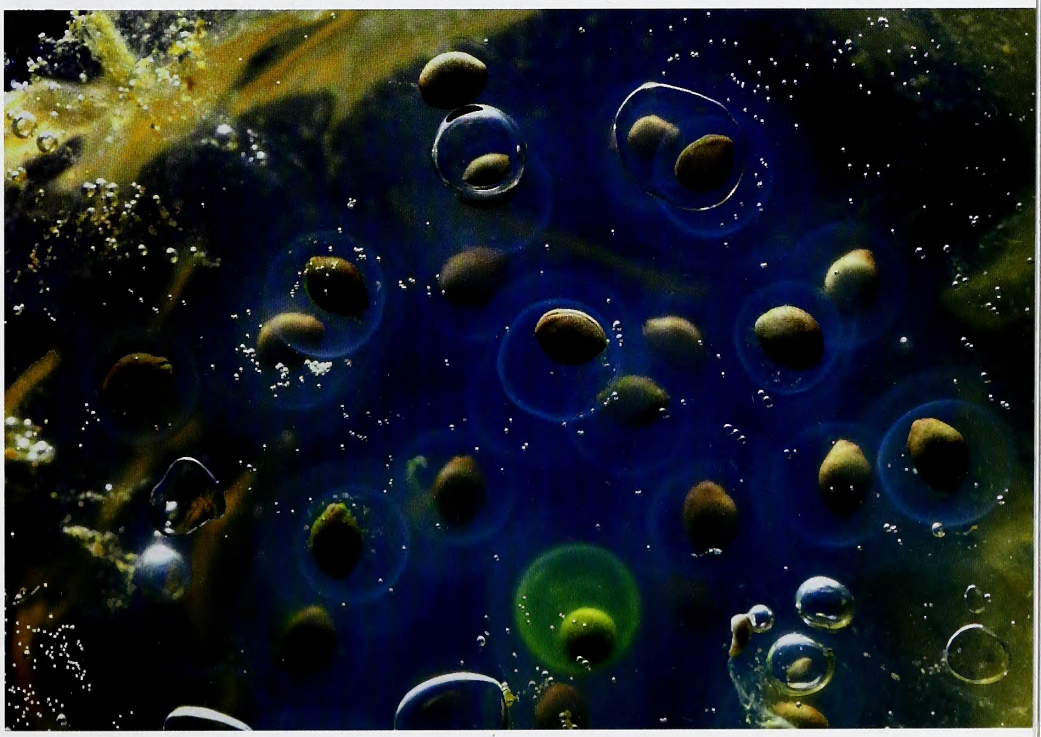
Gene Furr, Raleigh
Gray treefrog, Raleigh

Furr was working on his deck one afternoon when he spied this treefrog in the afternoon light. "I stopped working, got my tripod and started taking shots of him," Furr said. The result was this intriguing image.

REPTILES & AMPHIBIANS
SECOND PLACE

Mark McDermott, Carrboro
Alligator eye, Fort Fisher

Liverpool, England, native McDermott, a UNC-Chapel Hill student, loves photographing North Carolina's wildlife. He snapped this fascinating close-up at of a captive juvenile at the N.C. Aquarium at Fort Fisher.



REPTILES & AMPHIBIANS
THIRD PLACE

Mark Kostich, Mebane
Salamander egg mass, Chapel Hill

Kostich, who works at UNC Hospitals, found and photographed this egg mass at the N.C. Botanical Gardens during his lunch break.

REPTILES & AMPHIBIANS
HONORABLE MENTION

Mark Kostich, Mebane
Five-lined skinks hatching, Mebane

Kostich's young son discovered these skink eggs under the family's deck and covered them with leaves to protect them. After checking them every day, they discovered the hatchlings emerging and captured these two siblings greeting one another in their first moments of life.

REPTILES & AMPHIBIANS
HONORABLE MENTION

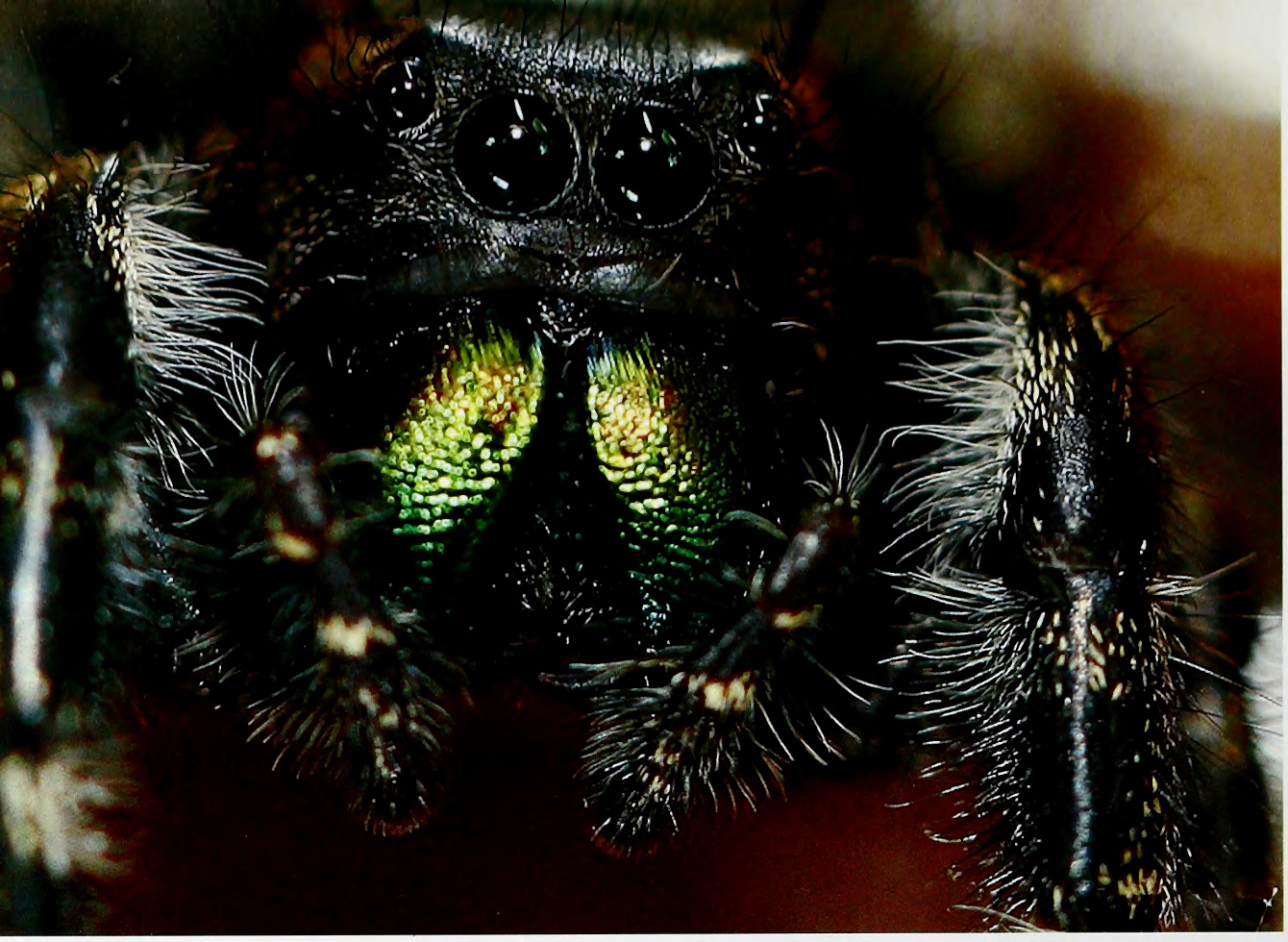
Michael Kozischek, Raleigh
Fence lizard, Bullock

While out last spring taking photos of orb spiders, Kozichek somehow spied this superbly camouflaged fence lizard and created a compelling photo.

INVERTEBRATES **FIRST PLACE**

Ed Erkes, Goldsboro
Dragonfly, Johnston County

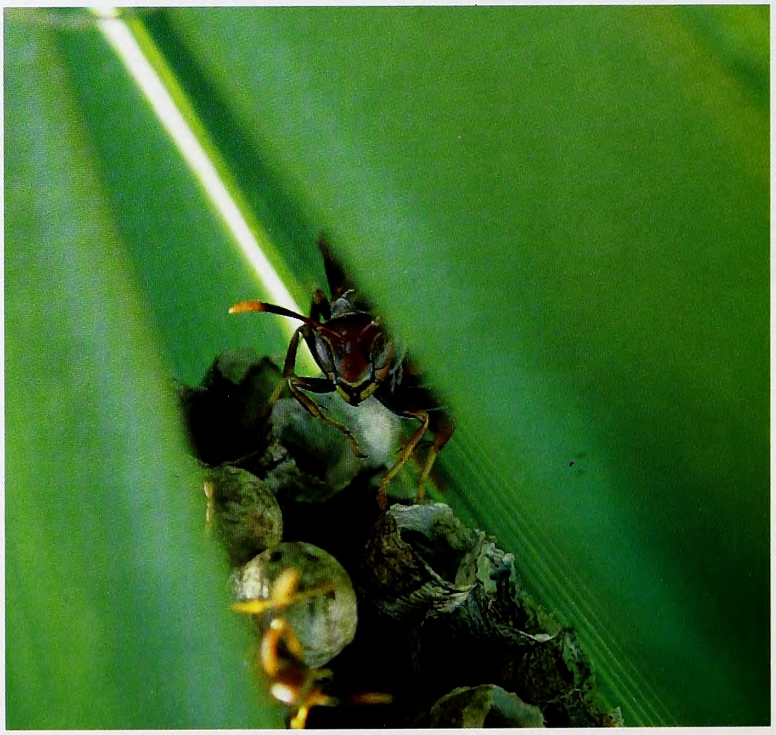
This dragonfly, its color still vibrant, appears to be in suspended animation in a spider's web. Erkes said he was searching for dew-covered webs at Howell Woods when he came upon this life-and-death tableau.



INVERTEBRATES **SECOND PLACE**

Patrick Chipley, Pikeville
Jumping spider, Pikeville

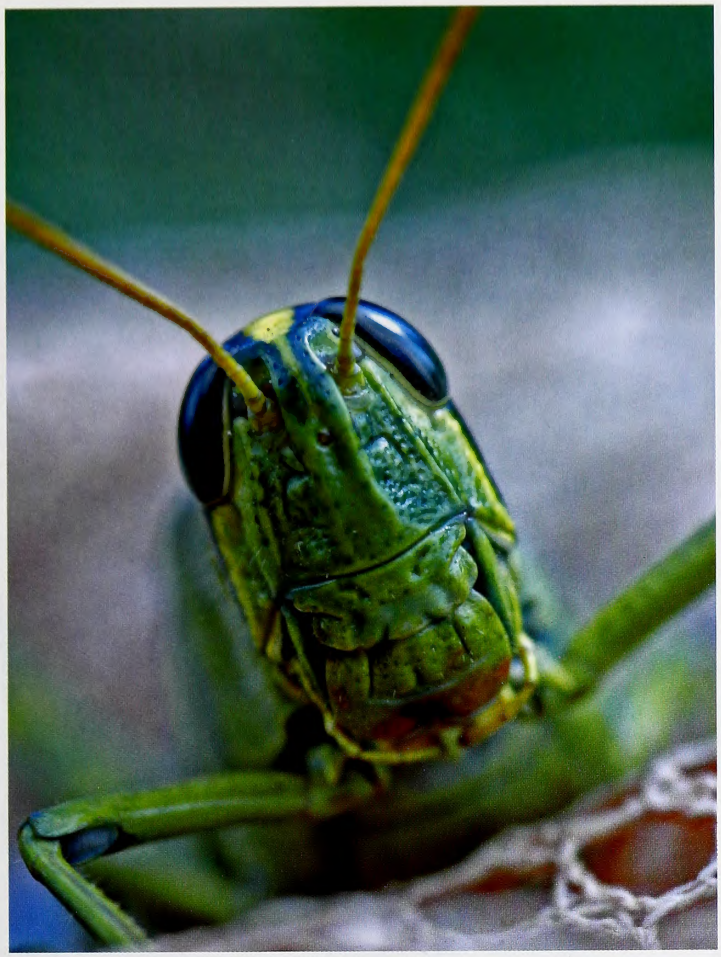
Gotcha! Chipley made superb use of his macro lens in capturing this extreme close-up during the summer of 2006.



INVERTEBRATES **HONORABLE MENTION**

Thomas Curd, Pollocksville
Paper wasp, Pollocksville

Curd found a wasp nest in a windmill palm in his backyard and peeked between the leaves to create this menacing photo.



INVERTEBRATES **HONORABLE MENTION**

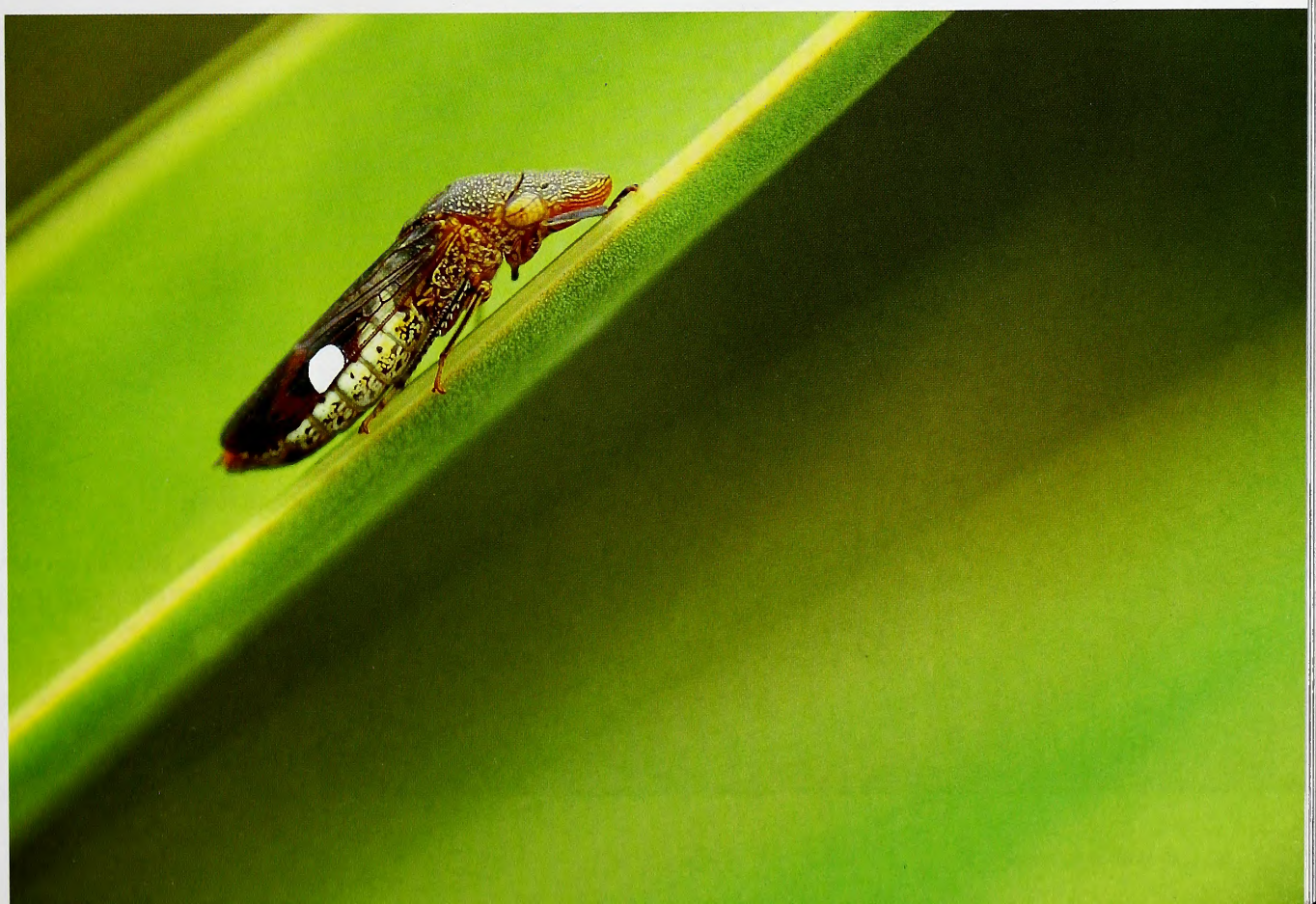
Ben Koski, Boone
Grasshopper, Union County

Koski got close to take a photo that makes this common insect seem somewhat alien.

INVERTEBRATES **THIRD PLACE**

Nate Bacheler, Morehead City
Glassy-winged sharpshooter, Carrot Island

On one of his frequent photo trips to the small island off Beaufort, Bacheler photographed this colorful leaf hopper on a yucca plant.



WILD PLANTS **FIRST PLACE**

Nate Bacheler, Morehead City
Maple leaves, Croatan National Forest

After a sunrise rain near Havelock, Bacheler got right up on these maple leaves and composed an excellent shot that contains all kinds of beautiful color.

WILD PLANTS
SECOND PLACE

John Stroud, Raleigh
Water lilies, Chapel Hill

Last year's grand prize winner Stroud captured the simple beauty of water on lily pads on a photographic trip to the N.C. Botanical Garden.

WILD PLANTS
THIRD PLACE

Hobart Jones, Mount Airy
Dandelion, Mt. Airy

Jones was taking a walk about his yard testing a brand-new camera when this dandelion, with a seed waiting for a ride on the wind, caught his eye.

WILD PLANTS
HONORABLE MENTION

David Hattori, Apex
Maple leaf, Blue Ridge Parkway

Hattori's composition shows how two ordinary things, a fallen leaf and frost, can make an arresting photograph.

WILD PLANTS
HONORABLE MENTION

Jim March, Campobello, S.C.
Poplar leaf, Polk County

This poplar leaf near the Green River reveals its intricate patterns when lit by the sun.

OUTDOOR RECREATION **FIRST PLACE**

Hazel Erikson, Sharps Chapel, Tenn.
Surf fishing, Cape Hatteras

Erikson hit the beach at dawn and climbed up on a waterfront deck to get this gorgeous wide-angle photo of surf anglers in fall 2005.

OUTDOOR RECREATION
SECOND PLACE

Jessica Benton, Greensboro
Hiker, Appalachian Trail at Max Patch

Benton's photo shows the expansiveness of this mountain bald and the solitude that sometimes goes with hiking the AT. The hiker seems to be headed right into the clouds.

OUTDOOR RECREATION
THIRD PLACE

Nate Bacheler, Morehead City
Camping, Croatan National Forest

The Neusiok Trail makes a great two-day hike. Bacheler took advantage of his one-night stopover to capture this idyllic image of morning light streaming through the forest onto his campsite.

PEAKS, VALLEYS & PLAINS **FIRST PLACE**

Lance Richardson, Chapel Hill
Cypress and clouds, Neuse River

Richardson was visiting a friend near New Bern to help set flounder nets when this perfect combination of trees, water and approaching storm clouds demanded his attention.

PEAKS, VALLEYS & PLAINS
SECOND PLACE

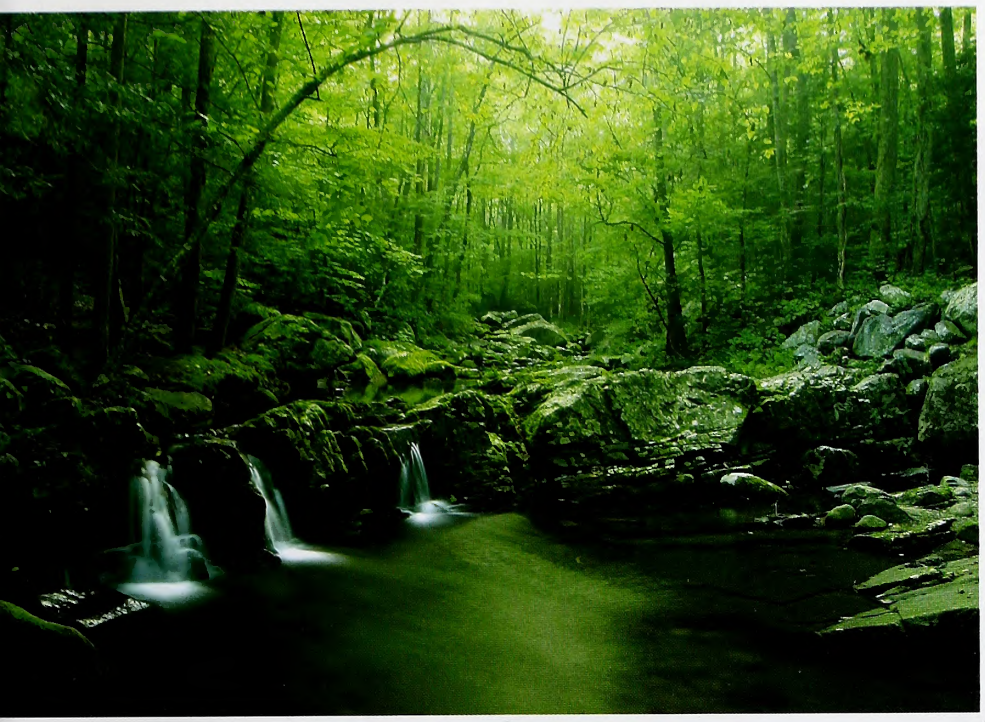
Lynne Townsend, Boone
Mountains in mist, Boone

After waking many times and seeing tranquil, foggy sunrises, Townsend decided to capture the view from the top of Green Knob Mountain Road with her camera.

PEAKS, VALLEYS & PLAINS
THIRD PLACE

Peter Larkins, Burke, Va.
Three Top Mountain, Ashe County

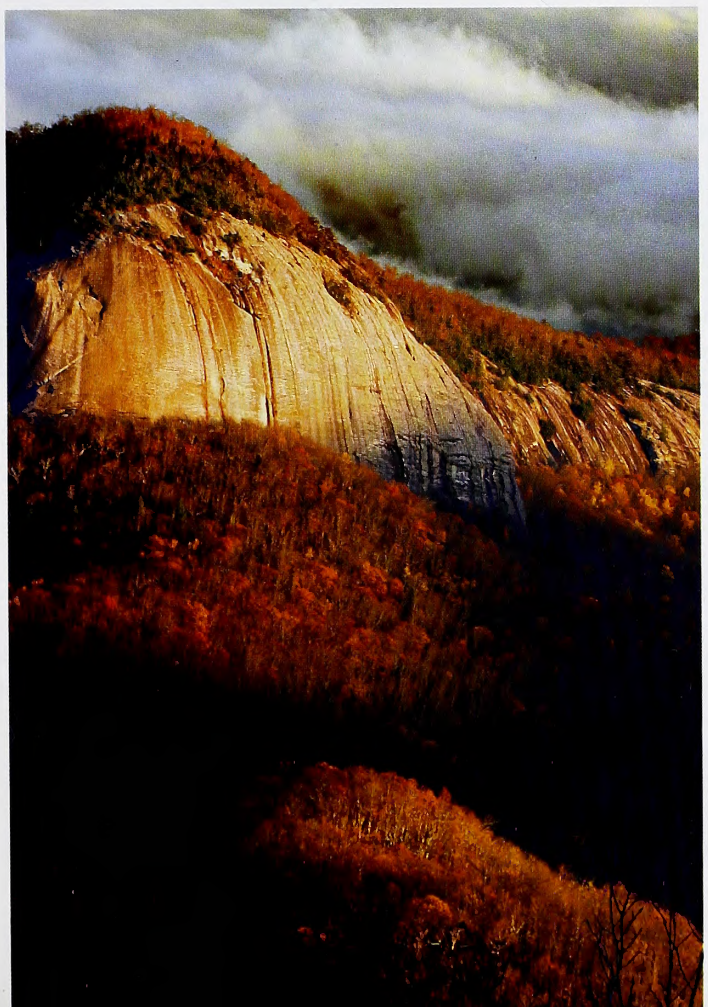
While hiking with friends, Larkins was struck by the beauty of these icy peaks with low clouds rolling past.



PEAKS, VALLEYS & PLAINS
HONORABLE MENTION

Nate Bacheler, Morehead City
Waterfall, Big Creek

Bacheler traveled far from his coastal home to visit the Great Smoky Mountains National Park, where he photographed this small triple waterfall on Big Creek.



PEAKS, VALLEYS & PLAINS
HONORABLE MENTION

Bruce Siulinski, Brevard
Looking Glass Rock, Blue Ridge Parkway

Siulinski waited for the perfect moment at sunset to record this striking image near his home in Brevard.

ANIMAL BEHAVIOR **FIRST PLACE**

Paul Wagner, Cary
Mating fruit flies, Raleigh

Using an 800-millimeter macro lens and flash, Wagner illuminates the miniature world of these fruit flies caught mating on a zinnia at the J. C. Raulston Arboretum.

ANIMAL BEHAVIOR
SECOND PLACE

Peter Rulon, Stella
Twin blue herons, Swansboro

Rulon first saw and photographed only one blue heron, but then he snapped away as another heron approached and the two began circling and threatening one another in a dance of dominance.

ANIMAL BEHAVIOR
THIRD PLACE

Charles Twine, Chapel Hill
Cardinal bathing, McLeansville

Twine's photo of the state bird is all flying feathers and water droplets as the cardinal makes use of a birdbath.

YOUTH PHOTOGRAPHER 13–17
FIRST PLACE

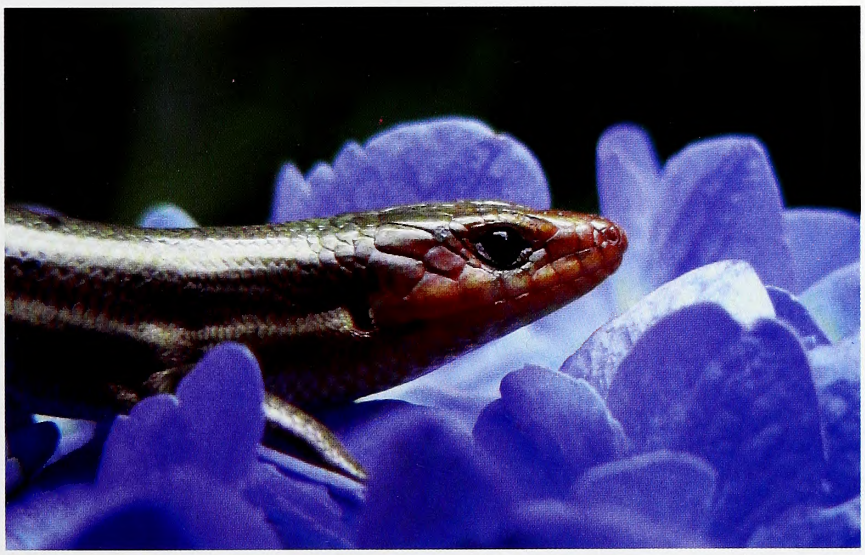
Todd Fishman Elliott, Union Mills
Green frog, Union Mills

Elliott won second place in 2005 in the 12 & Under category. This year he earned both first and second in the 13–17 group. After hearing frogs singing at a pond near his home, Elliott snapped this vivid close-up view.

YOUTH PHOTOGRAPHER 13–17
SECOND PLACE

Todd Fishman Elliott, Union Mills
Fishing spider, Union Mills

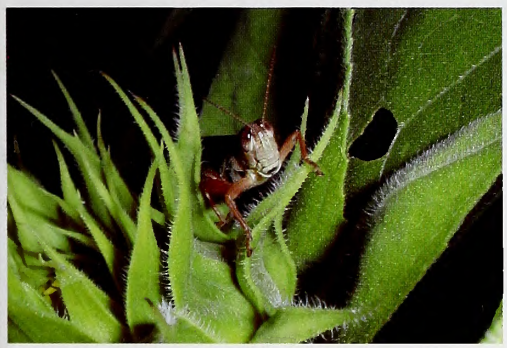
This fishing spider waits motionless at water's edge, perfectly camouflaged, waiting in ambush for its next meal.



YOUTH PHOTOGRAPHER 13–17
THIRD PLACE

Nathanael Gass, Durham
Broadhead skink, Durham

Gass, who was the 12 & Under winner last year, scores again with this striking photograph of a skink among hydrangea blossoms.



YOUTH PHOTOGRAPHER 13–17
HONORABLE MENTION

Sarah Adcock, Oxford
Grasshopper, Oxford

Adcock creates a striking study in green with this grasshopper on a sunflower.

YOUTH PHOTOGRAPHER 13–17
HONORABLE MENTION

Catherine Marshall, Greensboro
Jumping spider, Raleigh

Marshall caught this jumping spider, a predatory species, as it was hunting at Prairie Ridge.

YOUTH PHOTOGRAPHER 13–17
HONORABLE MENTION

Scott Cory, Lexington
Immature bird, Lexington

Cory found this young bird eyeing its future habitat in his mailbox.

YOUTH PHOTOGRAPHER 12 & UNDER
FIRST PLACE

Margaret Malone, Apex
Eastern black swallowtail caterpillar, Apex

Eight-year-old Margaret's parents planted this fennel in their yard specifically to attract caterpillars. She liked that the swallowtail was positioned on the plant so you could see its legs. The composition of her photo is flawless.

YOUTH PHOTOGRAPHER 12 & UNDER
SECOND PLACE

Anna Sorenson, Clayton
Tachnid fly, Durham County

On a photo expedition with a botanist, 10-year-old Anna captured this interesting insect on a mountain mint plant. Her photo is so tack-sharp, you can see every little hair on the fly.

YOUTH PHOTOGRAPHER 12 & UNDER
THIRD PLACE

Anna Gass, Durham
Toad, Eno River

While walking along the Eno, Anna's attention was drawn to this toad resting on a log.

YOUTH PHOTOGRAPHER 12 & UNDER
HONORABLE MENTION

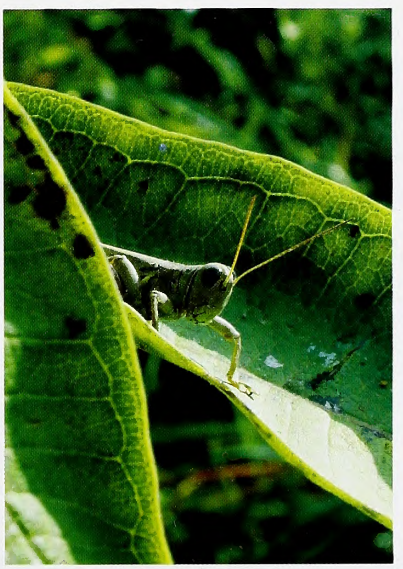
Hannah Styles, Robbinsville
Snowy woods, Robbinsville

Hannah, 10, loved the beauty of this snowy scene in her backyard and cropped her photo for maximum effect.

YOUTH PHOTOGRAPHER 12 & UNDER
HONORABLE MENTION

Emily Smith, Morganton
Mushrooms, Morganton

Ten-year-old Emily photographed these emerging mushrooms in her backyard during the spring of 2006.



YOUTH PHOTOGRAPHER 12 & UNDER
HONORABLE MENTION

Lucas Bobay, Holly Springs
Grasshopper, Raleigh

Lucas, 10, snapped this close-up during an August 2006 photo class for kids at Prairie Ridge.

GOLDEN MOUSE

Close your eyes outside on a dark night and think what it would be like to have special hairs by your mouth and nose that might tell you what is around you. Imagine knowing where every tree and shrub is because those hairs tell you how the plants have shaped the air currents. Imagine knowing every bug that flies by the way it moves the air.

VIRGINIA OPOSSUM

Imagine Having Vibrissae

written by Roger Powell / illustrated by Consie Powell / nature activity by Anne M. Runyon

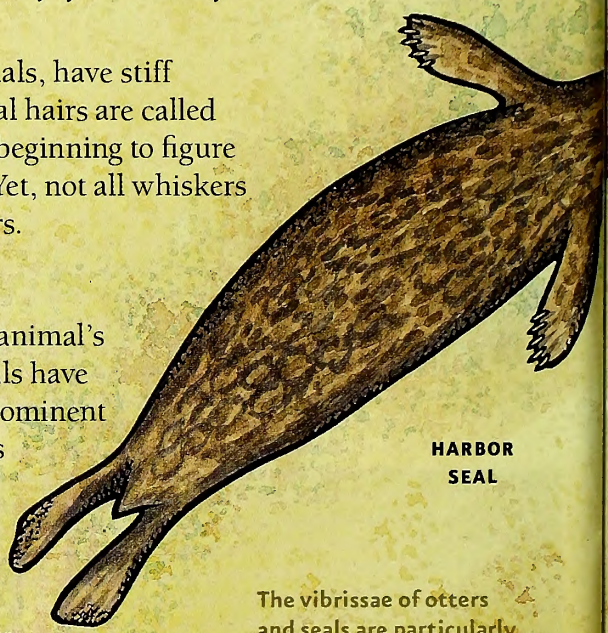
Almost all land mammals, and most aquatic mammals, have stiff hairs that stick out from their muzzles. These special hairs are called vibrissae (vi BRISS ee), and biologists studying them are beginning to figure out what they do. Most people call these hairs whiskers. Yet, not all whiskers are vibrissae and not all vibrissae are whiskers.

GRAY FOX

WHAT ARE WHISKERS?

In general, we call prominent hairs on an animal's (or person's) face whiskers. Most mammals have short hair covering their faces and long, prominent whiskers that stick out from their muzzles and chins. People do not have faces covered by hair, so the prominent hairs that some men grow as beards and moustaches are also called whiskers. Although people's whiskers are often a little stiffer and curlier than hairs on the tops of their heads, human whiskers are still, basically, regular body hair and are not vibrissae. In fact, humans are among the few mammals that don't have vibrissae.

Vibrissae grow in places other than on a mammal's face, and these vibrissae would not be called whiskers. Many mammals have vibrissae on their wrists and elbows.

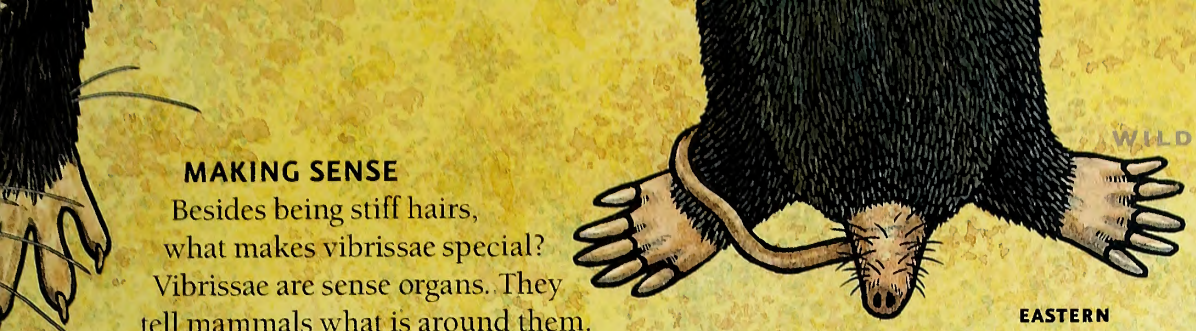


HARBOR SEAL

The vibrissae of otters and seals are particularly stiff and robust because water moves with more force than air.

The singular for vibrissae is vibrissa (vi BRISS uh).

OTTER

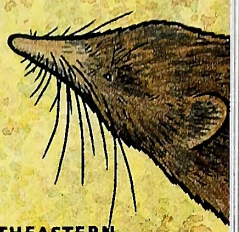


EASTERN MOLE

MAKING SENSE

Besides being stiff hairs, what makes vibrissae special? Vibrissae are sense organs. They tell mammals what is around them. Although vibrissae might be considered part of a very special kind of touch, they are no more like the regular sense of touch than echolocation is like the regular sense of hearing. Yes, bats have to hear for echolocation to work. But by using echolocation bats don't just hear bug noise; they learn where bugs are flying, how far away they are, how fast they are flying, what bugs they are and how they might best be caught. That is not simple hearing.

Likewise, vibrissae tell mammals what is in the space around them that they cannot see. Moving down its tunnel, a mole can tell where it is in the tunnel just as well as you can tell where you are in your house by how the rooms look. The mole knows how its tunnel feels.



SOUTHEASTERN SHREW

Some people believe that whiskers tell a mammal whether a space is big enough for the mammal to go through. As a rule, a mammal can pass through any place that its head will fit, which is much smaller than the spread of its whiskers.

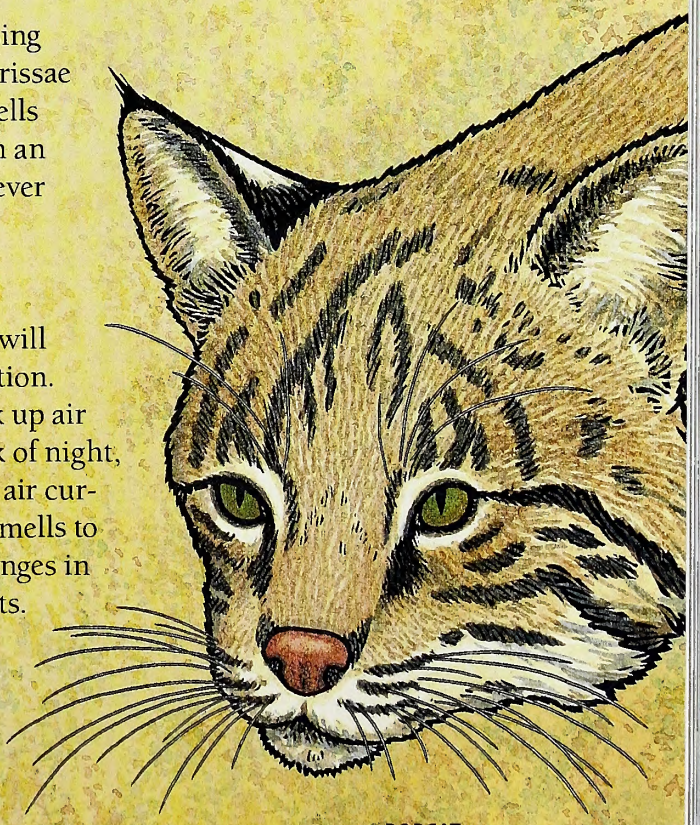
FOLLOW THAT FISH

A weasel can track a mouse by smell. A wolf can follow a deer by sight. And a seal can follow a fish by feeling the trail of moving water that the fish leaves behind. Even if the water is so murky that it can't see a fish, a seal's vibrissae feel how the water moves to "show" the seal where the fish went. As the seal gets close to the fish, its vibrissae tell it that the fish is near. "Feel" is not exactly what the seal is doing, but because we humans have no idea what having vibrissae is like, we have no better word for that kind of sensation.

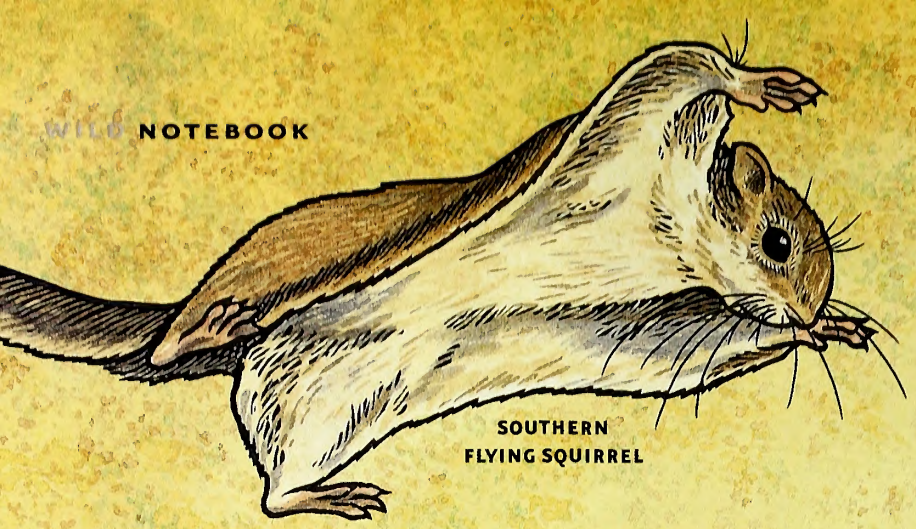
Otters, undoubtedly, can also follow fish underwater using their vibrissae. The nerves that stretch from an otter's vibrissae anchor in the brain in areas with high numbers of brain cells that lead to tremendous sensitivity. The dense vibrissae on an otter's muzzle give the otter great ability to perceive whatever has caused the vibrissae to move.

VIBRATING VIBRISSAE

A mouse, exploring the world around it, will have its vibrissae in constant motion. The vibrations may pick up air movements. In the dark of night, when vision is limited, air currents not only bring smells to a mouse but changes in those air currents. These changes may tell the mouse that something has moved the air and the mouse must be cautious.



BOBCAT



SOUTHERN FLYING SQUIRREL

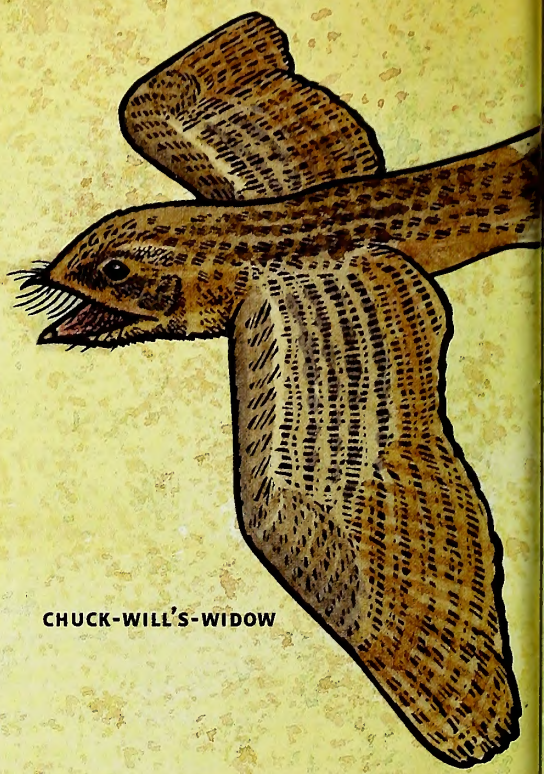
Other animals have "whiskers" that work like vibrissae. Many birds, especially those that catch insects for food have stiff, vibrissae-like feathers around their beaks and eyes called rictal bristles. When a bird is carrying an insect in its mouth, its rictal bristles may help it know what the insect's legs and wings are doing, thereby helping to protect the bird's eyes. Rictal bristles may also help birds catch insects by letting the bird know exactly where the insect is as the bird reaches for it.

BIG VIBRISSAE, SMALL VIBRISSAE

By looking at its vibrissae, you can learn important information about a mammal. Animals with big vibrissae live in places where other senses do not work well. They may live in dark places, be active at night or do important things, such as hunt for food, in places where vision is poor or hearing and smell are masked. Small mammals that often use tunnels, forage in the dark or swim underwater do have big vibrissae. Big mammals that live in open spaces do not have big vibrissae.

Vibrissae on elbows and other places on the body send the same sort of information to the brain as do vibrissae on a mammal's muzzle. Vibrissae in other places, of course, send information about what is close to that place; what is near the left elbow or near the right wrist.

Vibrissae undoubtedly tell mammals far more than we know, and probably more than we can guess. Vibrissae are the key to a sense that humans simply do not have. We do not know exactly how much vibrissae tell animals about air currents or bugs or tunnels.



CHUCK-WILL'S-WIDOW

RACCOON

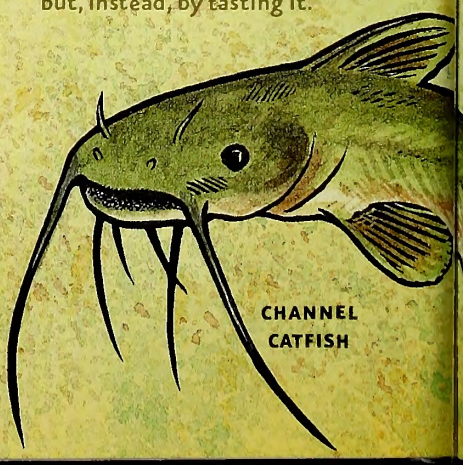
Get Outside

Look at vibrissae up close and personal. Though humans don't have vibrissae, anyone who has pets, or knows somebody with pets, has ample opportunities to look at our furry friends' special sense organs. If you have an easygoing dog or cat that especially likes to be patted, you may be able to actually touch some vibrissae. How do vibrissae feel compared to other hairs? How does the animal react when you touch one of its vibrissae? Look all over the face for vibrissae, then look elsewhere. Where else on the face do you find vibrissae? Where else besides the face? And how many do you find there?

Even if you can't pat an animal and feel its vibrissae, you can look closely. Look at other animals besides dogs and cats; look at mice, rats, gerbils, hamsters, cows, horses, sheep or whatever animal you meet. Compare the vibrissae: Who has long ones? Who has short ones? What other differences can you see?

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org

Catfish have barbels, which also look somewhat like vibrissae, except that they tend to reach back or down. Barbels, however, are lined with taste buds. So, barbels help catfish find food not by feeling it but, instead, by tasting it.

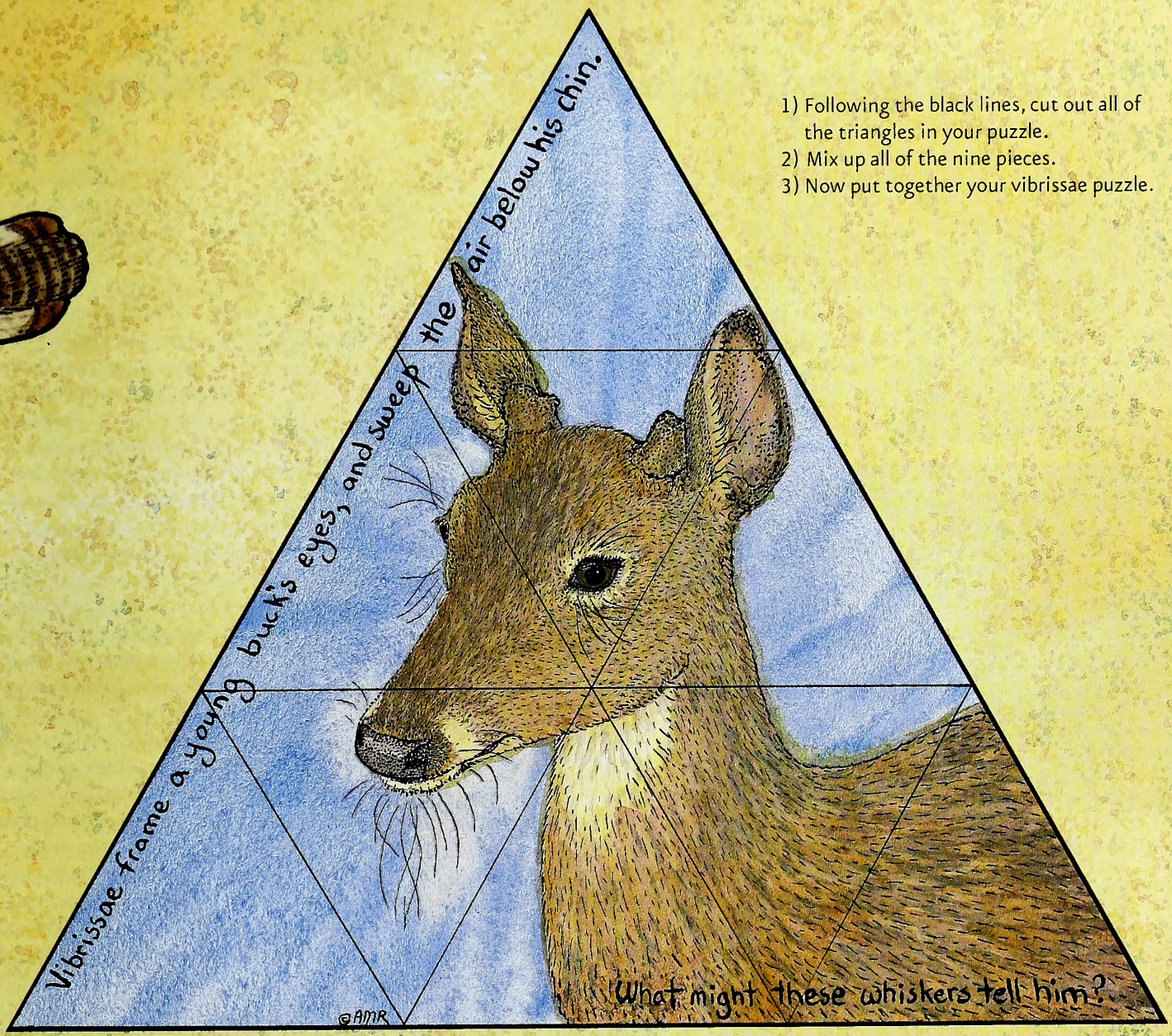


CHANNEL CATFISH

Vibrissae Puzzle

Vibrissae frame a young buck's eyes, and sweep the air under his chin. What might these whiskers tell him?

1) Following the black lines, cut out all of the triangles in your puzzle.
2) Mix up all of the nine pieces.
3) Now put together your vibrissae puzzle.



This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Hatchery Renovations Will Aid Fish Stocking

Although they may not know him, North Carolina anglers will reap the benefits of the hard work Jeff Evans has put in at the Watha State Fish Hatchery. Since March 2005, the hatchery superintendent and his crew have overseen extensive renovations at the Pender County facility that will increase by 50 percent the hatchery's capacity to raise and stock warmwater fishes in public, inland waters across the state.

JODIE B. OWEN

After renovations, the Watha Hatchery can produce more than 6 million fish per year for stocking.

"We've installed a water reuse system to improve the drainage and water supply systems," Evans said. "We've also constructed a 12,000-square-foot fish production building that will increase our production capacity of striped bass, American shad, channel catfish and other warmwater fishes needed for our fishery management programs."

The Watha crew also reshaped production ponds and installed harvest kettles for each pond so they could more efficiently harvest the ponds for statewide stocking of fingerlings. Before the renovation process, the numbers of hatchery-produced fishes stocked varied from 3 million to 4 million per year. Now, Evans expects that more than 6 million fish will be stocked annually. Initially, the commission will concentrate stocking efforts on producing American shad fry for its restoration program.

Thirty-eight ponds totaling 45 acres of water will provide temporary accommodations for seven other fish species:

- Striped bass—stocked in 14 inland reservoirs, and four coastal rivers in eastern North Carolina.
- Bodie bass (hybrid cross between striped bass and white bass)—stocked in six inland reservoirs.
- Channel catfish—stocked in the commission's Community Fishing Program sites across the state.
- Largemouth bass, bluegill and redear and redbreast sunfishes—stocked based on requests from district fisheries biologists to augment existing fisheries or to create a fishery in a new pond or lake.

The renovations, funded through a $5 million grant from Federal Aid in Sportfish Restoration funds and the Wildlife Endowment Fund, were badly needed since space limitations at the old hatchery prevented commission personnel from producing multiple fish species efficiently at one time.

"In the past, our spawning and hatching facilities were only large enough to focus our production efforts on one species—like striped bass—at a time," Evans said. "Once production goals were met, we could shift our efforts into producing channel catfish or American shad."

Now, the facility is large enough to produce several species at one time and fulfill all stocking requests in a timely, efficient manner. "The renovated facility and water supplies at Watha are designed with flexibility for the future in mind," Evans said. "Not only has the production capacity of the facility been dramatically increased, but the facility has the capability of accommodating any changes in the commission's warmwater fish production needs for the future."

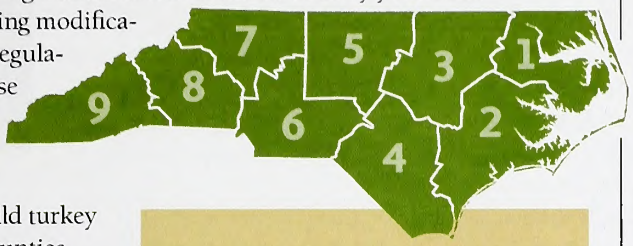
Before 1992, the commission conducted its warmwater fish production program at a fish hatchery in Fayetteville. However, due to space shortages and poor water quality, stocking requests for warmwater fishes were either incomplete or not fulfilled.

In 1992, the commission purchased the hatchery near Watha because it was large enough with optimal water quality to satisfy all warmwater fish production needs. From 1992 to 2002, these production needs expanded dramatically, with annual stocking numbers for striped bass fingerlings doubling from 600,000 to 1.2 million and the numbers for channel catfish expanding from 30,000 to 180,000.

JODIE B. OWEN

Bear, Turkey Proposals on Hearings Agenda

The N.C. Wildlife Resources Commission has proposed adding nearly 500 acres to the state's game lands that could be used by youth and disabled hunters, making modifications to bear hunting regulations that clarify the use of bait, and presenting two proposals that would affect hunting seasons for wild turkey and bear in specific counties.



All the proposals will be subject to public comment at nine district hearings, to be held across the state in January, before consideration for approval.

Date	District	Location
Jan. 8	4	Bladen Community College, Dublin
Jan. 10	5	Alamance Co. Courthouse, Graham
Jan. 11	6	South Stanly High School, Norwood
Jan. 16	8	Heritage Middle School, Valdese
Jan. 17	9	Ramsey Center, Cullowhee
Jan. 18	7	Starmount High School, Boonville
Jan. 23	1	Swain Auditorium, Edenton
Jan. 24	2	Craven County Courthouse, New Bern
Jan. 25	3	Annex Bldg., District Court Room, Louisburg

Hearings begin at 7 p.m. Check www.ncwildlife.org for changes in the public hearings schedule.

The following proposals will be included for public review:

- **Bear baiting**: Working with conservation partners, commission staff drafted revisions to rules that establish natural food vs. processed food for bait definitions, and sets rules for hunters and hunting with dogs within areas that previously had been baited.
- **Bear season**: In Beaufort, Camden, Chowan, Craven, Dare, Hyde, Jones, Pamlico, Pasquotank, Tyrrell and Washington counties, the season would extend from the second Monday in November to the following Saturday and the third Monday after Thanksgiving to the fifth Saturday after Thanksgiving. In Bertie, Currituck, Gates and Perquimans counties the season would extend from the Saturday preceding the second Monday in November to the following Saturday and the third Monday after Thanksgiving to the fifth Saturday after Thanksgiving.
- **Spring wild turkey season**: In Bladen, Brunswick, Duplin, New Hanover and Pender counties, the season would extend from the first Saturday in April through the Saturday of the fourth week thereafter for bearded or male turkeys on private lands. Seasons on game lands in these counties would remain unchanged.
- **Orange County Game Land**: Some 500 acres of land owned by the Orange County Water and Sewer Authority would be added to the Wildlife Resources Commission's Game Land Program, and would be limited to bow hunting, along with a limited number of permitted hunts by youth and disabled sportsmen.
- **Supplemental feed for game birds on controlled preserves**: This would allow a hunting preserve operator to feed domestic-raised game birds, such as pheasants, chukar partridges and Hungarian partridges, within the preserve and to hunt in the supplementally fed areas.

ON PATROL

On Saturday, July 2, 2006, Sgt. Wes Barger received a call about a large black bear treed in the downtown area of Tarboro. Sgt. Barger and Master Officer Sam Craft responded to the location to find a large black bear resting comfortably 25 feet up a large pecan tree. A crowd had gathered, and the Tarboro Police Department began roping off several city blocks to keep the curious away.

The bear had already raided an outbuilding, destroying a chest freezer, and then had been chased through town by the police, where it finally climbed the tree in a fenced-in back yard. In addition to the roaming bear, there were two funerals taking place on streets on either side of the pecan tree, and a wedding on the same street directly across from where the bear was treed.

ILLUSTRATED BY JACKIE PITTMAN

The officers called the N.C. Wildlife Resources Commission's Division of Wildlife Management for assistance. Biologists Wib Owen and Harlan Hall arrived and tranquilized the 350-pound bear. A net was stretched to break the bear's fall. The officers and biologists lifted the bear onto a trailer, and the bear was released onto game lands.

Mandatory Titling Takes Effect

Anyone who purchases or transfers a motorized vessel 14 feet or longer, owns a personal watercraft (jet ski) or has a lien on a vessel, regardless of size, will be required to title the vessel effective Jan. 1, 2007.

This mandatory titling requirement will affect only new vessel purchases and transfers; existing vessel owners will not be required to obtain a title certificate. The cost to title a vessel will remain at $20 and is effective until the owner sells or transfers the vessel.

North Carolina has been an optional titling state. The mandatory titling requirement was approved by the General Assembly in 2006 and is being implemented by the N.C. Wildlife Resources Commission. Mandatory titling will simplify the vessel registration process by providing a common form of proof of ownership.

MELISSA McGAW

Mandatory titling will also align North Carolina with surrounding states, all of which require a vessel to be titled, and make it easier for owners to sell their vessels out of state or who move to another state.

For more information, contact the commission on the Web at www.ncwildlife.org or by calling (919) 707-0398.

CALENDAR OF EVENTS

FRIDAY–SUNDAY, JAN. 12–14

Check out the latest rods, reels, lures and other fishing gear at the Bass and Saltwater Expo at the State Fairgrounds in Raleigh. Event also includes boat dealers and seminars with professional fishermen. Visit ncboatshows.com or call (336) 855-0208.

SATURDAY, JAN. 20

Learn the ins and outs of composting with worms and leave with your own composting bin and worms in the Vermi-composting Workshop at the Piedmont Environmental Center in High Point. Visit piedmontenvironmental.com or call (336) 883-8531.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

REMINDER:

Beginning Jan. 1, 2007, most North Carolina recreational fishermen will be required to have a Coastal Recreational Fishing License when fishing in coastal waters. For more license information, visit www.ncwildlife.org.

North Carolina Anglers Land Record Catches

NCWRC

North Carolina anglers have established two new fishing records, including one for a species new to the records list.

While most people associate salmon with the Northeast and the West Coast, Tony Robinson knows of a spot in western North Carolina that produces a salmon that can put up quite a fight despite its relatively small size. On Sept. 7, the Burke County angler landed a newly established freshwater fish state record for kokanee salmon. Robinson caught the fish, which weighed 9.2 ounces and measured 11½ inches in length, from Nantahala Lake in Macon County using a fin-tail spoon as a lure.

Kokanee salmon are native to the western United States. Those found in Nantahala Lake are a remnant population from a stocking done in the mid-1960s by the N.C. Wildlife Resources Commission in an attempt to establish the species as a forage fish for other predator fishes in the lake. In lakes, kokanee salmon do not grow very large—generally less than 20 inches in length—which is why they were stocked as a forage species. They feed almost exclusively on plankton and on small aquatic organisms, such as freshwater shrimp.

The second record fish was landed on the other side of the state, at Rocky Quarry Lakes in Maysville when U.S. Marine Sebastian Lankiewicz of Camp Lejeune in Jacksonville caught a longnose gar weighing 19 pounds, 10 ½ ounces. It was the second time in less than three months that the state record for the species had been broken.

NCWRC

Lankiewicz landed his record-breaker on June 29 using a crankbait. An avid bass angler who would like to turn pro one day, Lankiewicz was fishing for largemouth bass when he noticed a big splash and a fish floating belly up nearby.

"I got over to where I saw the splash and there was this fish floating upside down; it looked like the longnose gar was trying to eat the bass," Lankiewicz said. "So I tossed the lure and cranked it real fast and the fish went for it."

After a 20-minute fight, he reeled in the gar on 10-pound test. Lankiewicz's catch surpassed the previous longnose gar record, held since April 16 by James Thomas Bryant of Henderson, by a mere 2 ½ ounces.

For a list of all freshwater fish state records in North Carolina, visit the commission's Web site, www.ncwildlife.org.

IN SEASON

This month, these hunting seasons are open in North Carolina:

Bear: Through Jan. 1. See 2006–2007 *N.C. Regulations Digest* for dates and locations.
Bobcat: Through Feb. 28.
Common Snipe: Through Feb. 28.
Crow: Wednesday, Friday and Saturday of each week between June 1, 2006 and Feb. 28, 2007.
Fox: Runs Jan. 6–27. See *Regulations Digest* for locations.
Mourning Dove: Runs Dec. 18–Jan. 13.
Opossum and Raccoon: Through Feb. 28.
Pheasant: Through Feb. 1.
Quail: Through Feb. 28.
Rabbit: Through Feb. 28.
Ruffed Grouse: Through Feb. 28.
Squirrel: Red and gray season through Jan. 31.
White-tailed Deer: Central and Eastern gun seasons through Jan. 1.
Wild Boar: Through Jan. 1.
Wild Turkey: Winter either-sex season runs Jan. 15–20 in selected counties.
Woodcock: Runs Dec. 15–Jan. 13.

Migratory Waterfowl

Brant: Through Jan. 27.
Canada and White-Fronted Geese: Resident Population through Jan. 27; Northeast Hunt Zone through Jan. 27 by permit only.
Ducks, Coots and Mergansers: Through Jan. 27. (Harlequin duck season closed).
Sea Ducks: Through Jan. 27.
Snow, Blue and Ross' Geese: Through March 3.
Tundra Swan: Through Jan. 31 by permit only.

Check the *2006–2007 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit ncwildlife.org.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfowl stomp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

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Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

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Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

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☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. *(Credit card payments cannot be accepted.)*

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Mail completed application and payment to:

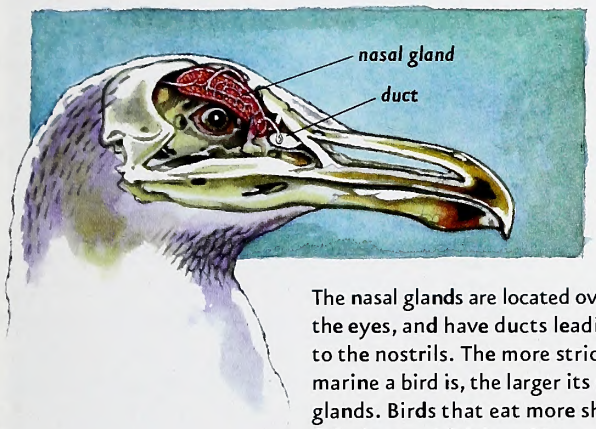
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

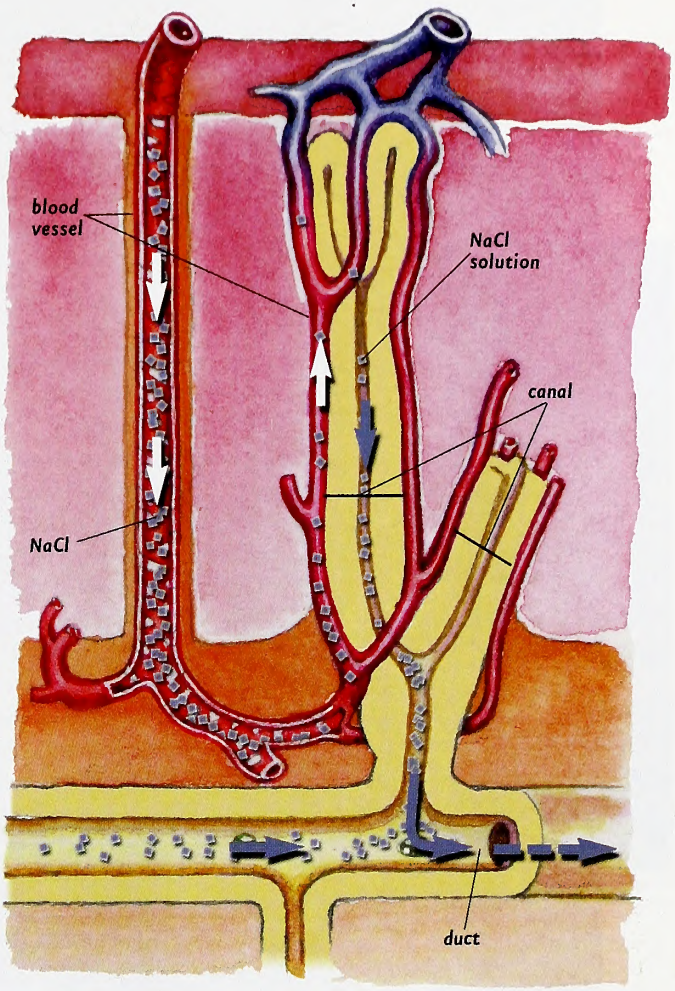
How Can Gulls and Other Seabirds Drink Salt Water?

written by Clyde Sorenson
illustrated by Jim Brown

GULLS AND OTHER SEABIRDS must drink salt water to provide the water they need. But their kidneys are less efficient than ours — it would take their kidneys 1.5 times more fresh water than the amount of saltwater imbibed to flush the excess salt out. Seabirds get rid of the excess salt a different way — with glands on their heads.



The nasal glands are located over the eyes, and have ducts leading to the nostrils. The more strictly marine a bird is, the larger its nasal glands. Birds that eat more shellfish than real fish have bigger salt glands, too, since their food is saltier.



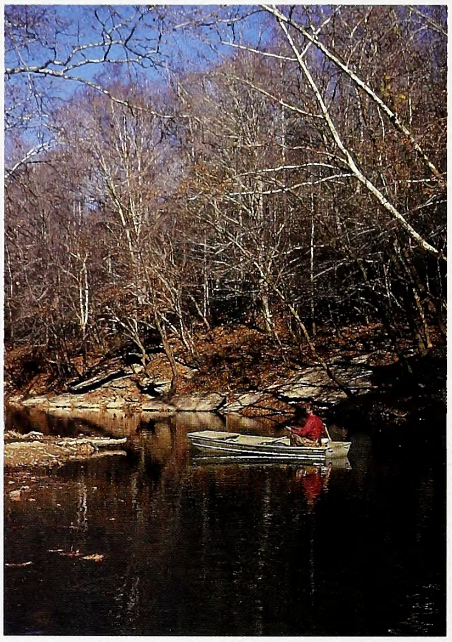
The nasal glands are composed of multitudes of tiny, branching canals, each lying immediately adjacent to a tiny blood vessel. Salt moves by osmosis, and by the activity of the cells in the canals, from the blood to the liquid in the canals. In some birds the liquid produced contains more than twice the salt of seawater.

The more salt the bird ingests, the more nasal fluid it produces. The liquid simply runs off the bird's bill; sometimes, a bird will "sneeze" it off. A gull with a "runny nose" isn't sick — it's just seeking salt equilibrium.

Squirrel Whispering

written by Jim Dean

Dad loved animals, and among the pets he owned at one time or another were two gray squirrels that he kept in a large cage in the backyard. When the squirrels were young, we would bring them into the house where they would chase each other up and down the curtains until they were tired. Then, they would eat a handful of hickory nuts on the kitchen table and retire for a nap—one in each of the front pockets of Mom's old quilted bathrobe, sleeping peacefully as she went about her chores.



JIM DEAN

It did not strike anyone in the family as unusual that Dad and I would frequently hunt their wild cousins in hickory and oak groves down along the Roanoke River. The notion that you cannot love a species that you also like to hunt is fairly recent—a sentimental offshoot of our conceit that humans aren't somehow really animals (or omnivorous predators either). Alas, that's what happens when we learn biology watching animated movies. Am I the only cartoon aficionado who wishes Wile E. Coyote would just once catch that cocky roadrunner and roast his insufferable butt on a spit? Nor should any of us think less of Walt Disney had Bambi's mom been served at a Hunters for the Hungry banquet.

"In my opinion, no wild meat on the planet is as tasty as squirrel (except rabbit)."

You can bet there was no anthropomorphic confusion when Dad and I were under the tall trees. I had my Winchester Model 69 bolt-action—a Christmas gift when I was 12—while Dad had his handsome Winchester Model 63 that had been factory-equipped with a Redfield peep-sight. Jack O'Connor had personally recommended that sight after Dad had written him in 1949 to ask his opinion. I still have O'Connor's answer on *Outdoor Life* letterhead.

We never bagged a lot of squirrels because they're tough targets for hunters with .22 rifles and iron sights. Those more intent on quantity typically hunt squirrels with a shotgun because there's a better chance of bagging a squirrel racing through the treetops. But we preferred to enter the woods quietly, choose a likely spot and wait for a more or less stationary target. Years later when my son Scott was old enough, Dad honored our family Winchester tradition by giving him a classic Model 62 pump.

When Scott killed his first squirrel—in what is now a high-dollar housing development along the Neuse River—we brought it home proudly. One squirrel is pretty slim pickings for a family of three, but we fried it up and made gravy to serve with enough mashed potatoes and biscuits to make up the difference.

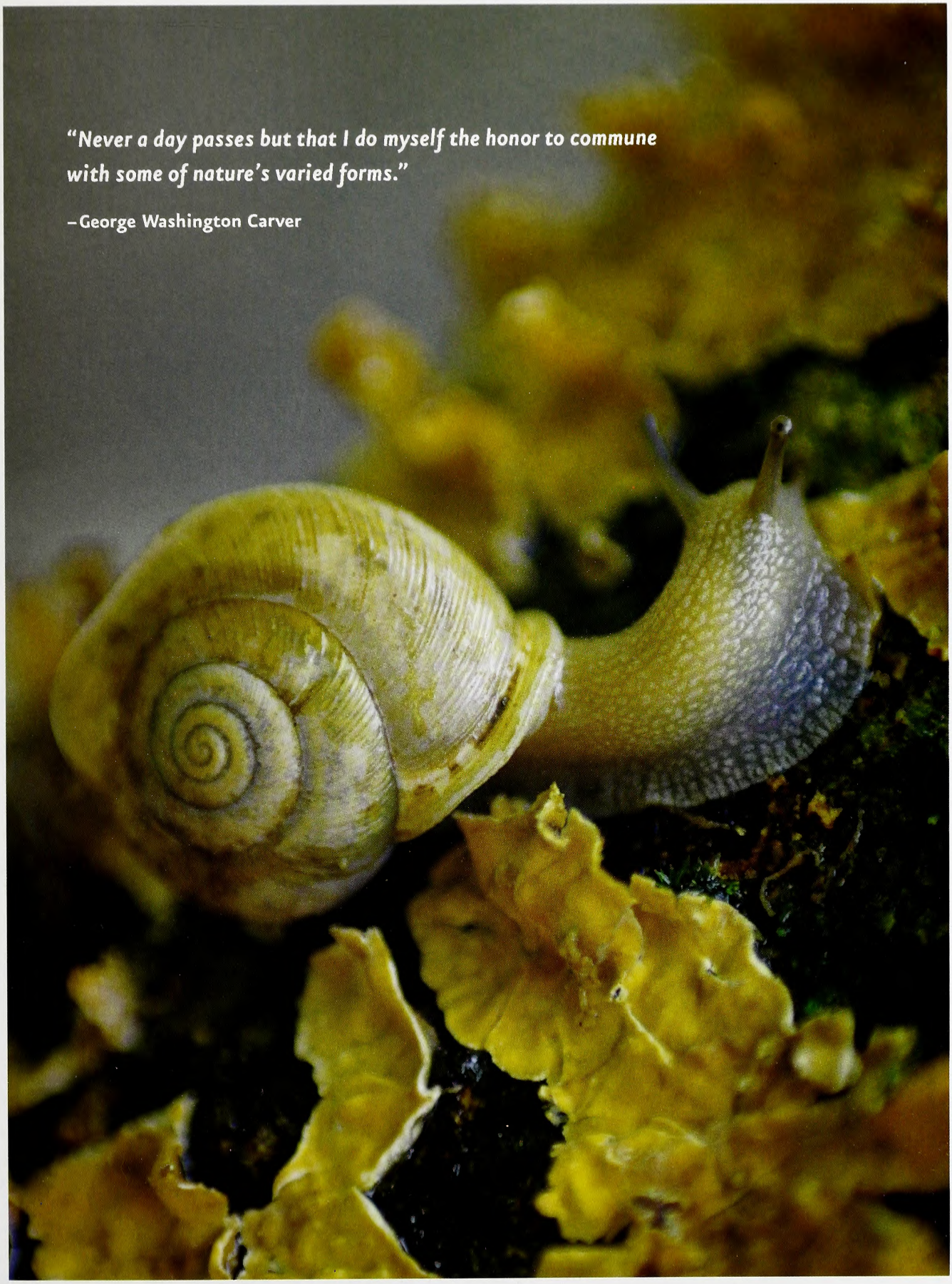
My daughter, Susan, was about 7 years old and quite adamant that she was not going to eat anything she regarded as cute. She retired to take her bath. Scott and I ate the golden brown pieces except for one leg that I took to the bathroom and placed on a paper towel on the edge of the tub. Behind the shower curtain, Susan reaffirmed her decision. "Well, just take a look at it, then," I said. "I'll come back and get it in a few minutes."

Ten minutes passed before I heard Susan calling. "Daddy, are there any more squirrels?" She'd left two bare bones.

In my opinion, no wild meat on the planet is as tasty as squirrel (except rabbit). I suspect you would agree if you've ever had Brunswick stew traditionally made with squirrel, and most assuredly if you were fortunate enough to be on hand when my friend Alvin Johnson decants bowls of his famous "rodent stew and dumplings" each fall at his mountain cabin on Wilson Creek. For sure, you would think of squirrels as more than mere pests clever enough to rob your bird feeders.

Aside from those early family hunts, the most memorable squirrel hunt I recall was an October float trip with Mike Gaddis on the Neuse River downstream from N.C. 50 shortly before Falls Lake was impounded. Huge sycamores, maples and oaks formed a corridor of brilliant color that was mirrored in the water. We stopped to inspect caves under high rocky bluffs covered with mountain laurel, and just above our take-out bridge, we collected squirrel No. 8. Then we drifted the final hundred yards, paying our last respects to this stunningly beautiful river.

In case you are wondering what became of Bushytail and Chatterbox, they matured and began to exhibit an all-too-typical tendency to bite the hands that fed them. Dad built a box for them in the crotch of a big oak in our backyard and began leaving the cage door open. Within a few days, they had established permanent residency in the tree. We haven't lived in that house for nearly 50 years, but I'll bet the bathrobe pocket clan still has heirs running through the old neighborhood.



TRACEY HELMSTETLER

IN THE **FEBRUARY ISSUE**

ERIKA LARSEN

COTTONTAIL CHASE

Bawling beagles on a cold day warms the hearts of the Taylor family like nothing else — rabbit hunting is in their blood.

DADGUM GROUSE

For one boy, a childhood fascination with Burt Spiller's writing led to a love for exhausting mountain grouse hunting.

AN ELUSIVE SUCKER

Only through a recent tagging program are biologists beginning to understand the little-seen robust redhorse.

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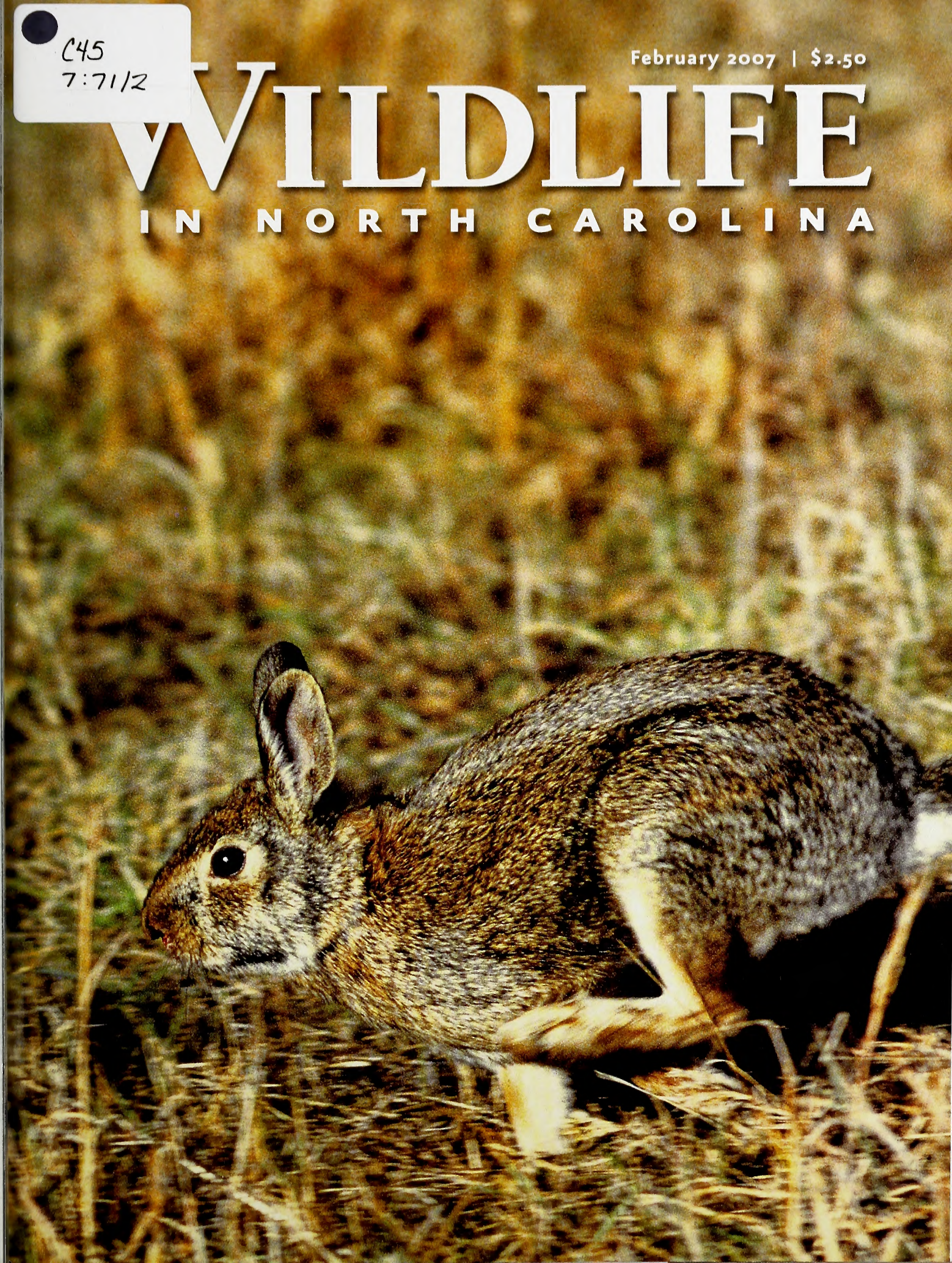

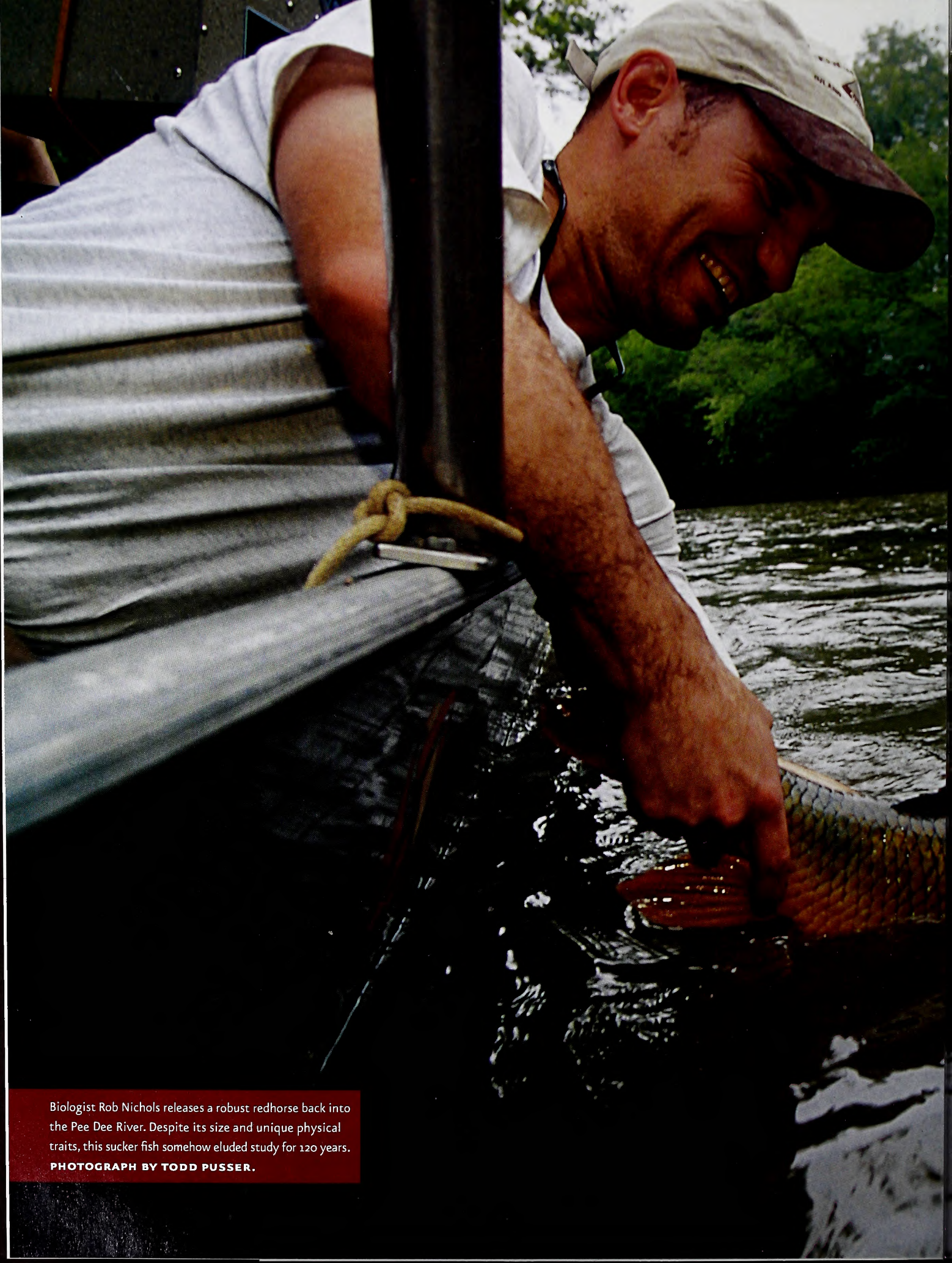

Biologist Rob Nichols releases a robust redhorse back into the Pee Dee River. Despite its size and unique physical traits, this sucker fish somehow eluded study for 120 years. **PHOTOGRAPH BY TODD PUSSER.**

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Cover: The docile Eastern cottontail becomes a wily, unpredictable foe when pursued. PHOTOGRAPH BY MASLOWKI PRODUCTIONS.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

With his savvy leadership, the late John Pechmann made a huge impact on natural resources in North Carolina. Under his guidance, the N.C. Wildlife Resources Commission grew and thrived while serving the public well, upgrading facilities like never before. The agency added thousands of acres to the state game lands program, built two wildlife education centers and a new headquarters, and made major fish hatchery renovations. He loved teaching children how to fish, so it is appropriate that the Wildlife Commission's fishing education center, scheduled to open this year in Fayetteville, will bear his name.

COURTESY OF THE PECHMANN FAMILY

"Very rarely did John's presence go unnoticed, not only through his stature, but also through the eloquent way in which he communicated his thoughts," wrote his good friend Lee Warren, state chairman of Ducks Unlimited. "John had a rare and unique ability to retain vast amounts of knowledge and pull them up at just the right time, allowing him to provide an educated and unique perspective on just about any subject."

Pechmann had weighty credentials, but that gravitas was balanced by an impish grin that hinted at his love for a good time. He joked that his knowledge of the South River made him "the best redbreast sunfish angler in North Carolina." Pechmann didn't come off as a politician — he seemed most interested in what he could do for individuals and for natural resources.

"John Pechmann represented all that is good about public service," said Richard Hamilton, executive director of the Wildlife Commission. "He brought a contagious passion to the work of conserving our natural resources both as wildlife commissioner and as chairman. John inspired excellence from everyone around him, but always took the heavy load himself. Our fish and wildlife resources are stronger today thanks to the work of John Pechmann. Hunters and fishers today and tomorrow owe a debt of gratitude to this incredibly gifted man."

"A Vision Realized" (page 10) honors Pechmann's conservation career. However, the greatest tribute will be the scores of kids who will learn about fishing in the building named after him. That's what would make Pechmann smile the most.

Greg Jenkins

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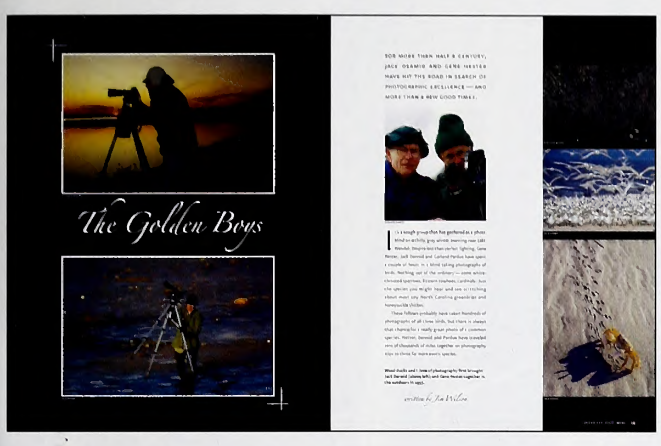


Golden Memories

Jim Wilson's excellent article "The Golden Boys" in the December 2006 issue brought back many stored memories. I well remember the first time I met Jack Dermid. It was the summer of 1950, and I was a young fish biologist with the N.C. Wildlife Resources Commission heading a survey of Lake Glenville.

It was mid-morning in a relentless mountain rain, and much to the less-than-approval of my crew of N.C. State College wildlife boys (including Gene Hester), we were preparing to head out onto the lake, rain or no rain.

Up the driveway to wildlife commissioner T.N. Massie's cabin came this solitary figure, rain dripping from his pith helmet and glistening poncho. "I'm Jack Dermid, commission photographer," he said. "I'm up here to photograph your lake survey."

He seemed about as surprised to see us preparing to work in the mountain monsoon as we were to see him expecting to get some photos. Some of them (all black-and-white, of course) are probably still in the commission's files. Jack never let a little bad weather slow him up—and he still doesn't.

Duane Raver
Garner

Just a note to compliment you on the wonderful article giving some very well deserved recognition to Jack Dermid and Gene Hester ("The Golden Boys") in your December issue. They are indeed North Carolina treasures and certainly should be recognized as such.

I have had the good fortune to know Gene over the years and watch his great work in the area of conservation, not only here in North Carolina but nationally, and I have enjoyed his and Jack's contributions to the magazine for many, many years.

The good news is they are both wonderful teachers, and will leave as their legacy not only their body of work but a lot of people that they have taught and inspired to carry it on in future generations.

Eddie Smith Jr.
Chairman and CEO
Grady-White Boats
Greenville

Duck Feet

Thanks for the Nature's Ways article on why ducks' feet don't freeze (Dec. 2006). My wife and I have wondered for some time what the deal is. We live in Montana and have pet Rouen ducks (they look like big mallards) on our pond. Thanks to an underground source, some of the pond stays thawed all winter unless it gets to about minus-20 degrees or so. We feed the ducks twice a day. When it is really cold they have to stop several times on the way to where we feed them, and they draw their feet up inside their feathers. We guess that when they jump out of the water the really cold air freezes the water left on their webbed feet and it hurts. When they get to the feed, they sit down and eat as your article mentions. Thanks again for the article. Now we know more about our ducks.

Fred Weisbecker
Retired N.C. wildlife officer
Hamilton, Mont.

Lofty State

Great article, interesting, well illustrated and written ("The North State Way," Dec. 2006"). These kinds of articles are very popular with readers in my opinion. I am pleased that I was able to pull the article up from the web site and e-mail to friends out of state. I have a subscription to the magazine and have had it since 1975. Keep up the good work. I am familiar with Virginia's and New York's wildlife magazines and believe North Carolina's is the best.

Tom Beckingham
Hampstead

Also Raising a Hunter

T. Edward Nickens' article in November's issue "To Raise a Hunter" is outstanding! My almost 5-year-old son Luke wants to go duck hunting with me already, but mama says no for obviously wise reasons. I have explained to him it's not all about the kill as much as it is the thrill of getting those ducks close enough to pull the trigger. I'm sure he does not get it yet, but he will. Just maybe, next year we will do what my dad and his son did some 30 years ago—sit under a big oak on our farm and bag some of those bushytails for mama. Thanks again for a well-penned article.

Durwood Evans
Princeton

Where Are The Kokanee?

The North Carolina fishing regulations state that there is a limit of seven kokanee salmon in N.C. Where are these fish and how do we fish for them? I would like to see an article in your fine magazine on this subject.

Walt Kent
Lenoir

Kokanee salmon were stocked in Nantahala Lake in the mid-1960s in an attempt by the Wildlife Commission to establish the species as a forage fish for larger predator species. A remnant population has survived for 40 years, and the Wildlife Commission now recognizes a state record for the species of 9.2 ounces ("North Carolina Anglers Land Record Catches," Back Porch, Jan. 2007). Kokanee salmon are common in the western United States. In lakes, the fish grow less than 20 inches long. Adults make a spawning migration up the Nantahala River each fall.

write us

Letters should be sent via e-mail to **letters@ncwildlife.org** *or through regular mail to Letters, Wildlife in North Carolina magazine, 1712 Mail Service Center, Raleigh, NC 27699-1712. Please include your name, address and daytime phone number. Letters chosen for publication may be edited for clarity and length.*

HUNTING SHEDS

The rewards of searching for antlers are not only unique trophies, but also increased hunting knowledge.

WRITTEN BY
GERALD ALMY

THE WHITE-TAILED DEER'S ANTLER SEEMED TO GLOW in the gray, misty light. With colors of mahogany and bone on its long, sweeping tines, the rack was one of the most impressive I had seen in years of hunting this great animal. My heart skipped a beat and pumped hard at the sight.

But this encounter was different from my other deer hunting experiences. It happened in April, well outside of deer season, and instead of being atop a buck's head, this single five-point antler was lying on a bed of brown oak leaves. As I picked up the antler, my first thought was this particular deer had survived another hunting season and, barring death by some other means, might still be alive. Already this buck would have begun the process of growing a new set of antlers. By the end of August, the process usually is finished.

MELISSA McGAW

GERALD ALMY

GERALD ALMY

GERALD ALMY

Deer trails (top) can be productive areas in which to search for shed antlers, while both scrapes (middle) and rubs not only reveal that deer have been in the area, but also indicate travel corridors. Seldom do deer, as evidenced by this buck, drop both antlers in the same location.

If you don't think hunting for shed antlers can be exciting, you've obviously never tried it. Though late to the game, having started just five or six years ago, I have become a fanatical shed hunter. I now can honestly say that I enjoy it almost as much as hunting deer with gun or bow. I'm not the only one who feels that way. Shed hunting has become so popular that guided, weeklong "shed hunts" in prime areas, with food and lodging included, can cost $3,000 or more. Fortunately, you can hunt sheds for free in your own hunting area or on public land.

Explaining the popularity of shed hunting is simple. Searching for antlers is the perfect way to extend your interest in whitetails and your "hunting" for them. It's a great way to exercise and stay in shape after the season has ended. It's a good family activity. And finally, the challenge of searching for sheds is appealing in itself. The feeling you get when you spot a bone-colored antler protruding from a bed of fallen leaves brings a sense of accomplishment that's hard to describe.

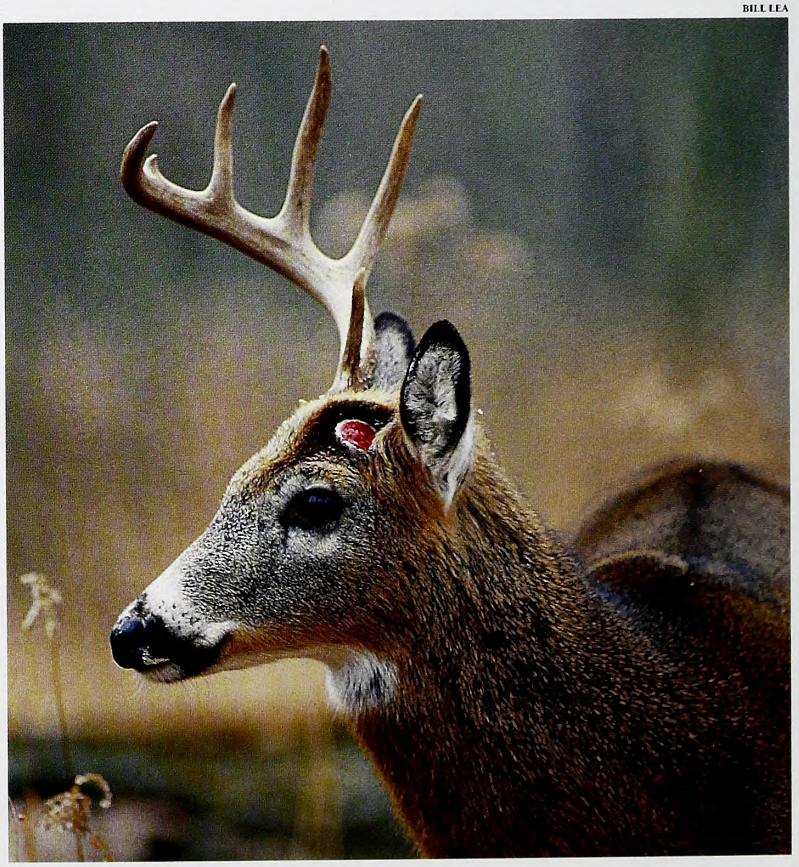
As you hold the rack in your hands, you run your fingers over it and feel the rough and smooth textures. You count the tines, study the abnormal kickers and stickers and wonder how this deer's rack will look next autumn. If the deer is at least 3.5 years old, its antlers should have the same basic shape next season. Younger deer often produce antlers of a different shape and configuration.

ANOTHER FORM OF HUNTING

Finding sheds can also provide information about the bucks in your hunting area. You can note genetic traits such as long or short tines, main beam shape and the fascinating oddities that make some bucks nontypicals. You can also get an idea of the age of the deer by the mass of the rack and the length of the main beam.

I consider searching for sheds as hunting —just a different form of it. Catch-and-release has long been popular among fishermen; searching for sheds is catch-and-release deer hunting. Find the rack, or half of it, from a buck in your hunting area, and you feel in one sense like you've "bagged" him, or at least one of the most intriguing parts of the animal—a part he no longer has a use for.

BILL LEA



If these weren't enough attractions, hunting shed antlers can make you a better hunter by showing you what areas bucks use on the land you hunt. No other time is as valuable for ferreting out the travel patterns of mature bucks as the period from late winter through spring. In fact, I often combine postseason scouting with shed hunting, doubling the benefits of the time spent in the woods. (See "Scouting Season," Feb. 2006.)

Bucks in North Carolina can shed their antlers at any time from December through April, but it's rare for them to fall off in December. In mid- to late January more bucks drop their antlers, and by late February or early March, most are walking around without headgear. A few stubbornly hold their racks until April. Some biologists speculate that deer with prime nutrition tend to keep their racks longer.

Though bucks may shed both of their antlers within minutes in one spot, this is the exception rather than the rule. Once I found a yearling buck's three-point rack neatly laid out at the edge of an oval bed in a grove of cedars. That deer must have gone to sleep and awoken with a bare head. That's the only set I've ever found so close together. Often, you'll find just one antler from a buck and never retrieve the other. Sometimes, you may find the mate antler far away from where the other side of the rack was located. I've found the two sides of a buck's rack nearly a mile apart. I knew they belonged to the same buck from watching that deer during the summer.

WHEN TO HUNT

Sometimes I go out early for brief forays in late January and early February and find a shed or two. But the problem with this is that another buck could walk through the area you just searched and drop its antlers a day or a week later, and you won't find them unless you search the same places again. (And there is a tendency to be less diligent when repeating a search.) So the later you wait, the less double or triple coverage you'll undertake.

On the other hand, as weeds, grasses and bushes begin to grow, antlers can become hidden and more difficult to find. And if you wait too long, chipmunks and mice will begin gnawing on the antlers for the phosphorous and calcium they hold. Other shed hunters may also work the area you plan to search and find the antlers before you do.

It's possible to find a few shed antlers by just taking a random walk in the woods, but you need lots of luck to succeed this way. Instead, focus your efforts. Start searching in areas where you've seen deer late in the hunting season. Prime locations are areas with food plots or leftover agricultural crops located near heavy cover, where bucks can hole up during the day and sneak out late in the evening or at night for a bite to eat.

It takes a watchful eye to spot an antler partially covered by fallen, brown leaves on the forest floor.

MELISSA McGAW

Thick stands of conifers, swamps and overgrown marshland, brushy hollows that offer some protection from cold winter winds —all are good bets for shed hunting. Check out creek bottoms, rhododendron and laurel thickets and brushy areas with greenbriers, honeysuckle and heavy sapling growth.

Some bucks drop their antlers along deer trails, so these are definitely worth following. Also check at fence crossings and narrow gullies or creeks, where a buck might jump across and jar an antler loose as he lands on the other side. Freshly logged areas are good spots to try because bucks gravitate there in the winter to feed on treetops left from the cutting. Burns are great places to hunt for sheds because the antlers stand out clearly against the black background.

Of course, bucks do drop their antlers in fairly open fields at times. But those are the easy ones to spot. Figure on lots of walking and scanning in thick weeds, brush and leaf litter for most antlers you find.

Try to use a systematic approach for the best results. Work in a straight line across the area you want to investigate, and then move up just above the area you covered and work back along a fresh strip of ground.

Some of the best shed hunting takes place right after a rain or even during a light drizzle. The antlers seem to shine when the rain moistens them. Cloudy days are also good. Harsh, glaring sunlight makes it harder to detect the antlers, but not impossible.

Don't hesitate to check prime areas a second time. I've thought I had covered a location well but searched it again a few days later, in different light or from a slightly different angle, and found several more antlers this way.

If you like to make your outdoor pursuits a social event, gather a few friends and put on a "drive" through an area, with each hunter walking 10 yards to 20 yards apart as you scour the landscape. Most youngsters love to hunt for sheds if given the opportunity, so bring your children or neighborhood kids.

Even if you make it a fun, social event, don't forget to keep the dual purpose of post-season scouting in mind as you search. You'll find lots of key pieces of information as you walk through the woods that should help you to be a better and more successful hunter this fall. ◆

Gerald Almy lives in Virginia and is a frequent contributor to Wildlife in North Carolina.

YOU MIGHT BE CURIOUS TO KNOW...

ANTLERS AND THE 'HOLY GRAIL'

Antlers, specifically their annual casting and regeneration, are as fascinating to some scientists as to hunters, for that process is a remarkable and singular feat among mammals. At the heart of the process is something truly rare: the apparent retention by deer of embryonic tissue throughout their lives.

Members of the deer family (Cervidae), which includes whitetails, mule deer, elk and moose, are the only mammals that can completely regenerate a body part. Other mammals can make repairs in bones and organs but not regenerate entire structures. Why cervids can regenerate structures—and do it annually in the case of antlers—when other mammals cannot remains a mystery.

F. EUGENE HESTER

If the mechanics of antler regeneration can be deciphered, researchers say, the knowledge could have major impacts on human health, specifically in the regeneration of damaged, diseased or excised tissue and organs.

Antlers are not attached directly to a deer's skull but instead grow from pedicles, which are extensions of the frontal bone. The formation of the pedicles at puberty (a buck's second spring) is caused when cells in the periosteum (the tough, fibrous covering of all bones) of the frontal bone are activated by increased testosterone levels. This specialized periosteum is called antlerogenic.

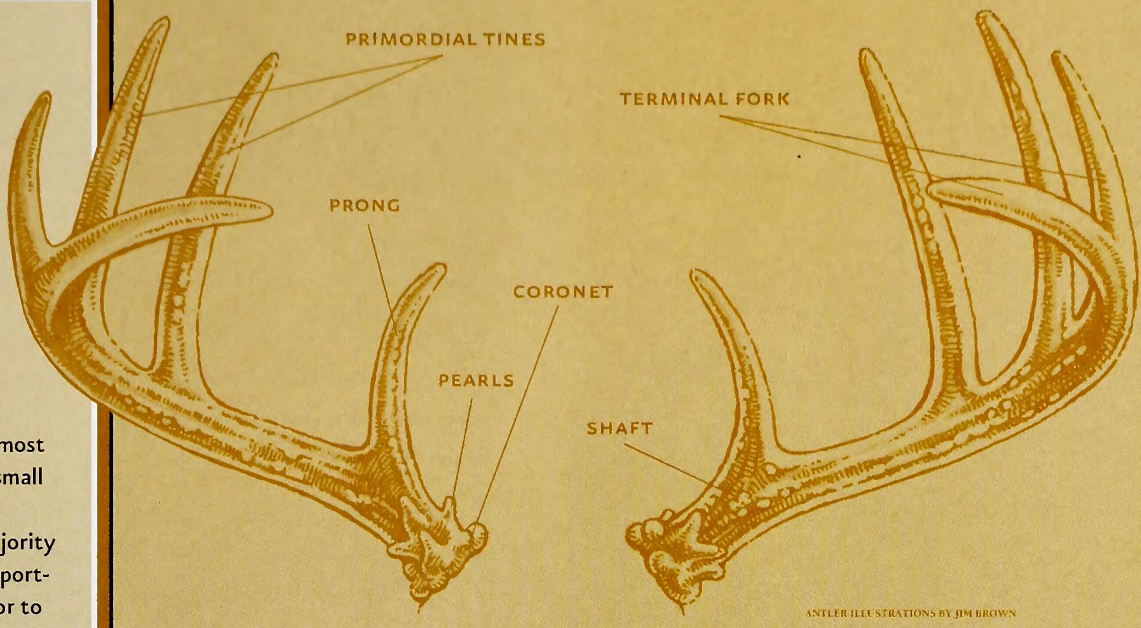
Scientists have transplanted antlerogenic periosteum overlying the pedicles of a fawn to other locations on the body. A small antler will form at the site of the transplant, but not from the pedicle where the tissue was removed. Antlerogenic periosteum also has been transplanted onto mice skulls and has produced a growth resembling antlers. In other words, antlerogenic periosteum cells, which are called self-differentiating cells, always produce antlers. Self-differentiating cells typically are an early developmental phase of tissue found in embryos. Some scientists have posited that antlerogenic periosteum is a piece of embryonic tissue that is retained after birth.

Within weeks of shedding his antlers in late winter or early spring, a whitetail buck begins to grow new ones. That growth is very rapid and is usually complete by the end of August. The growth of antlers is tied to the amount of daylight, as is the deer's reproductive cycle. As daylight decreases in the winter, the amount of circulating testosterone decreases, which eventually causes deer to cast their antlers. The antler cycle trails the decrease or increase in daylight because it takes time for the hormonal changes to take effect. Estrogen also plays a role in antler development, and may actually trigger the cessation of longitudinal growth in the fall.

Key for researchers is to discover how testosterone and estrogen in cervids are able to switch on the regenerative cells, and why other mammals can produce only limited regeneration. Understanding this ability, writes Joanna Price of the Royal Veterinary College in London, can help "take us further toward a 'holy grail' of modern human medicine: the ability to regenerate organs."

–Jim Wilson

ANTLER PARTS OF THE WHITE-TAILED DEER



ANTLER ILLUSTRATIONS BY JIM BROWN

ODDS OF SUCCESS

The number of antlers you find will vary according to the size and maturity of the deer herd. Areas with a good population of middle- to older-aged bucks will yield better results than those with a heavily pressured young herd. Fewer bucks live to cast off their antlers in such situations, and in herds where most of the bucks are yearlings, the small antlers are harder to see.

Remember, too, that the majority of deer in any area will not be sporting antlers. As an example, prior to the 2005–06 deer season, the N.C. Wildlife Resources Commission estimated that the state's 1.1-million-population deer herd contained 340,000 antlered bucks. During the season, 125,000 were killed (both hunting and nonhunting mortality), leaving 215,000 bucks to shed their racks. Multiply that figure by two to find the number of antlers, then divide by 35,312 miles—what the commission figures is usable deer habitat in the state—and you come up with 12 to 13 antlers dropped on average per square mile. A square mile is 640 acres.

That average, of course, could rise or fall depending on where in the state you might be shed hunting. Person County, with an estimate of more than 45 deer per square mile, would have more sheds than Jackson County, which has a population of fewer than 15 deer per square mile. Too, searching in western counties such as Jackson is going to be much more difficult than in the Piedmont.

Even in low-odds areas, though, diligent searching should turn up at least a few antlers. And when they are scarcer and harder to come by, each piece of cast-off bone you do find will mean that much more.

WHY DO DEER SHED THEIR ANTLERS?

Whitetail bucks spend considerable energy growing antlers each year, only to shed them in late winter. It would appear to be more practical to grow the antlers once and be done with it.

Some other animals, such as sheep and antelope, grow horns composed mostly of keratin and do not shed them. If a horn is broken or removed, it does not regenerate. Many hunters will call deer antlers "horns," but this is not correct.

Although white-tailed deer, *Odocoileus virginianus*, is one of the most studied animal species in North America, why bucks annually cast their antlers remains unclear.

Biologist Mickey Hellickson of the King Ranch in Texas has written that the most popular theory involves the importance of antlers in mating. Bucks use their antlers in dominance fights with other males. Too, a number of tests have shown that does prefer bucks with large antlers. And despite the fact that bucks are famous for chasing does during the rut, it is generally the doe that chooses the buck she wants to mate.

All of these antlers were collected in one fortunate morning of shed hunting.

GERALD ALMY

One reason, then, deer shed and regenerate their antlers might be to replace damaged antlers. If antlers were permanent, a broken main beam would be an impediment to breeding opportunities.

According to Hellickson, some other theories are that bucks shed and regrow antlers in order to keep pace with their rapidly increasing body size, and that shedding antlers is an evolutionary quirk with no real purpose.

A Vision REALIZED

Time moves like a river, changing but never ceasing its forward progression. A good fisherman knows the river, its water full of life and opportunity.

Long before John Edward Pechmann launched his last cast, the former N.C. Wildlife Resources Commission chairman had already landed a prize haul for every citizen who values the natural beauty, the hunt, the invaluable resources of the outdoors.

A heart attack took Pechmann's life on July 15, 2006. His legacy is, to some, the way he could make a fishing line dance with lazy loops as he cast a fly onto the water. But to those who never witnessed his skill for the cast, he is the man who saw to it that millions of acres were secured for their children to fish, hunt, identify birds, ride horses or paddle on the scenic waters that cut through the land.

WRITTEN BY *Monica Holland*

"John was a visionary," said Steve Windham, vice chairman of the Wildlife Commission. "He realized a long time ago that in order for us to pass along the hunting and fishing heritage to our children, we were going to have to acquire more land." The commission's land acquisitions doubled during Pechmann's tenure as chairman, from 1999 until 2006, to reach 2 million acres of managed game lands across the state.

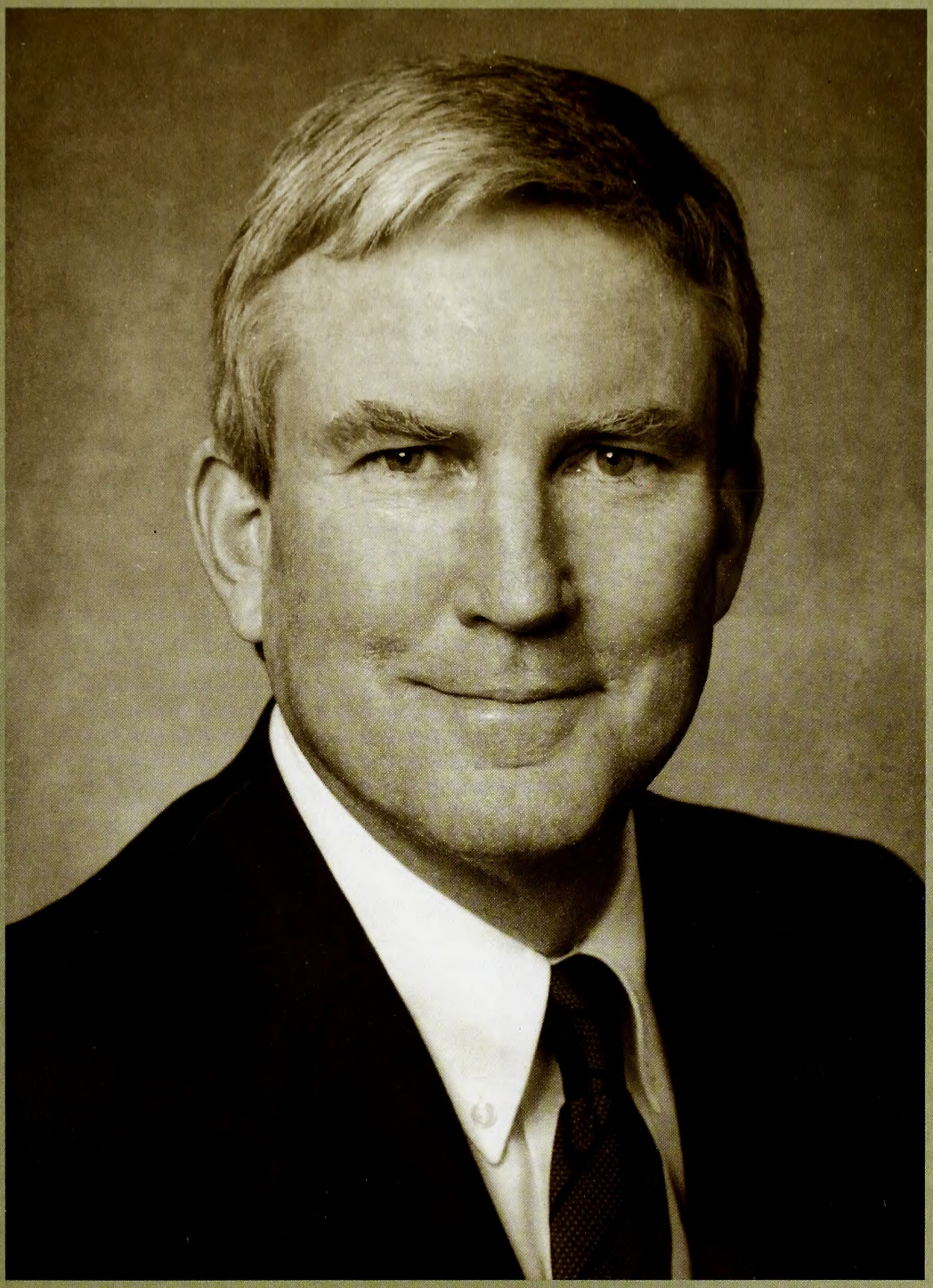
Outreach efforts to youth were also at the top of the 2001 Conservationist of the Year's priorities. In September 2006, the commission dedicated the John E. Pechmann Fishing Education Center at Fayetteville's Lake Rim to the man who turned his private interest into public service. "He exemplified what it meant to be a fishing educator," said Kris Smith, a wildlife information and education specialist at the center. "He was always excited about getting out there and teaching kids about fishing and the environment. He really wanted the commission to focus on outreach to kids. . . . We wanted to create this prototype based upon his model to get kids interested in the outdoors and teach them what they needed to know in order to feel comfortable."

The new fishing education center is on schedule for completion this summer, just in time for a youth fishing day to be held the first Saturday in June. The dedication was held on a day when more than 500 children lined catfish-stocked ponds as part of Ducks Unlimited's 14th Greenwing youth fishing day at the Lake Rim center. Pechmann championed the conservation group, doubling the commission's annual contribution to $30,000 in 2004.

Pechmann also brought fishing opportunities to youngsters through partnerships with parks and recreation departments. Lake Rim becomes home to more than 1,000 stocked trout when waters cool, and kids can learn to land rainbow and brook trout at fly-fishing clinics that cost $5 apiece for beginner and advanced skill levels.

John Pechmann was a dedicated public servant, a strong conservationist and an advocate for all sportsmen. Under his leadership, the North Carolina Wildlife Resources Commission made the state a better place to enjoy fishing, hunting and recreation. John's passion and commitment to the great outdoors were unparalleled. His death is a great loss to the state of North Carolina.

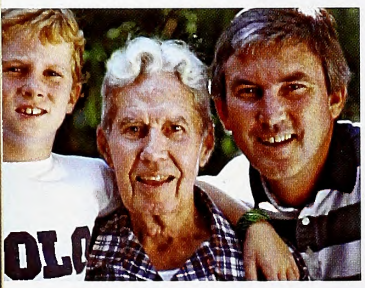
– Gov. Mike Easley



John Pechmann's many accomplishments as chairman of the N.C. Wildlife Resources Commission reflected his passion for people, wild places and the simple joys of wetting a line.

1948–2006

Pechmann had powerful allies such as Marc Basnight (top), and won awards such as 2001 Conservationist of the Year (middle), but his family was most important to him. Lower left: son Jack and father Edward with Pechmann. Lower right: mother Lillian.



John had a way with words that made a person feel good about himself and what he was doing. He was very dedicated to his position as chairman of the Wildlife Commission. John made it a point to know as many of the staff as possible, and was interested in their particular role in the operation of the Wildlife Commission. His untimely death was a sad day for me.

We always talked about "resource first," and he was a firm believer in that. I was fishing with him for the first time on the South River, his favorite fishing hole, and I caught a large bream—over a pound. "That is the biggest bream I have seen come out of the South River," John said. "Of course, we are going to throw it back."

"What do you mean we are going to throw it back?" I said. John replied, "We don't take any female bream out of the South River." He smiled. "Resource first."

—John Lentz, former wildlife commissioner

John lived for others, to make their opportunities richer. He especially wanted to be certain that there was a place for people to hunt, fish and enjoy nature. He stressed the value of those things to the lives of all people in this world. He was truly an incredible human being that I will surely miss.

—Marc Basnight, president pro tem, N.C. Senate

The late commissioner was known to volunteer at clinics, sharing his knowledge of fishing techniques as well as information about moon phases, fishes' bedding habits and the lore of the learned angler. Pechmann's knowledge and ability were on display in October 2006 when an episode of the UNC-TV show "Carolina Outdoor Journal" aired featuring the former chairman at one of his favorite fishing holes. In the true spirit of the avid angler, Pechmann was adamant that the location of the pond not be disclosed.

Pechmann graduated from the University of North Carolina's law school in 1973. He practiced in Fayetteville, where his family has lived since the 1960s. He and his wife, Amy, were married in Beaufort in 1989. She said he had wanted to wed her on a pier. His son, Jack, is a senior at N.C. State.

Born in Memphis, Tenn., in 1948, he was the oldest of five children. His brother, Gregory, was paralyzed in a car accident in the late 1970s, but it has not kept the accountant from finding success. Pechmann's sisters, Phyllis and Anne, operate a jewelry store and veterinary practice, respectively. His sister, Mary Kaye, resides with his mother, Lillian. Pechmann's father, Edward, died in 1984.

Perhaps having a beloved family member in a wheelchair piqued Pechmann's concern for disabled sportsmen. He formed a Disabled Sportsmen's Committee in recent years to heighten hunting and fishing opportunities for the handicapped. Of the 185 boating access areas managed by the Wildlife Commission, 51 are handicapped accessible.

Pechmann's deep love of fishing alone would not have been enough to inspire his dedication to improving outdoor opportunities and wildlife habitat. Amy remembers her husband waiving fees for unfortunate clients who had to struggle to eke out payments. She remembers

I never knew anybody who loved North Carolina or the outdoors more than John. He dedicated a huge part of his life to preserving one of our greatest resources. He wanted to make sure it was there for everybody else.

– Tony Rand, state senator

Top left: Pechmann's 1989 wedding to Amy in Beaufort. Top right: a nice-looking striper caught on the Roanoke River. Bottom: kingfishing with son Jack.

ALL PHOTOS COURTESY OF THE PECHMANN FAMILY

the tears in his eyes when one of those clients broke into sobs, thanking him for generosity that she had long been denied.

The kitchen clock serves as a constant reminder of Pechmann's love for his wife. It is fixed at 1:43, the couple's numeric code for "I love you." He would leave notes with this code scribbled on them throughout the house or in Amy's car. She spent many evenings holding an umbrella over Pechmann as he fried fish in the rain on their backyard deck after he was subtly informed by his wife's candles that not everyone enjoyed the smell of fresh fish the way he did. Near the grill, a St. Francis statue embodies Pechmann's Catholic faith and his love of nature. He would set out early on Sundays, hitting the lake before mass at St. Elizabeth Ann Seton, where his mother played the organ.

According to gospel, Jesus chose his first apostles from the ranks of fishermen. But to Amy, the habit itself could be rank. "He would sit down and I would have to hold my nose because he reeked of fish. But he thought fish smelled wonderful," Amy recalled. "He would leave after communion and go back fishing for the rest of the afternoon."

Gordon Myers, the Wildlife Commission's deputy director of operations and technical services, credits Pechmann for revitalizing the state's hatcheries, citing "his investment into fish-hatchery infrastructure and, in turn, improved production capability" as major steps forward. Myers accepted the Sir Walter Raleigh Award presented to the commission's administrative headquarters on N.C. State's Centennial Campus for its environmental responsibility. Pechmann was a staunch advocate for the high-performance building, which provides natural lighting, minimizes environmental impact, incorporates solar control and uses energy efficiently..

"There is not a finer greenspace office in the U.S.," Windham said. "John had the forethought to look at things from many different angles, not just from a hunter's standpoint or a fisherman's standpoint, but in a way to help every citizen. . . . His charge to every commissioner was that if you put the resources first in each and every decision you make, then everything else will work out."

The land acquisitions, the boating access areas, the hatchery renovations, the formation of committees, the increased contributions to conservation groups, the outreach to children, the new award-winning commission headquarters: All the advancement in Pechmann's tenure serves as a testament to the man whose passion was simply to dangle a hook. "No member of the commission ever gave more of himself or his time," said Gene Price, the longest-serving member of the Wildlife Commission.

"The unexpected passing of John Pechmann makes us so aware that we cannot measure and appreciate the true height of a great tree until it has fallen," Price said during his invocation at a Wildlife Commission meeting in which the former chairman was honored.

And so the river flows. The waters keep moving even if our hearts are still. ◆

Monica Holland is the outdoors writer for The Fayetteville Observer.

As we travel on our journey through this transitory life, we encounter many of God's masterful creations. I am extremely thankful for the day that John came into my life, for indeed he was one of these wonderful creations.

John was blessed with many talents, including the ability of care and compassion. There was no question as to his devoted love for Amy and the wonderful life that they shared. There was not a prouder moment than when he was talking about his son Jack. I remember one time when John was on the phone with Jack and he was trying to convince his dad that everyone was expected to attend that N.C. State bowl game in Florida over the holidays. I seem to recall that "extra credit" was mentioned somewhere in the conversation.

Whether his role was husband, father, son, brother, uncle, cousin or just friend, John seemed ready to stand and fight if necessary for the part that he was to play in any situation. My personal goal is to be as good a friend to those that I refer to by that name as John was to me.

– J. Lee Warren Jr., state chairman, Ducks Unlimited

Family tradition: Reshad Williams, Ed Taylor, Dungee Taylor and Bill Taylor.

THE RABBIT FAMILY

THE TAYLORS OF VANCE COUNTY KNOW BUNNIES AND BEAGLES AND HOW TO GET THE TWO IN CLOSE PROXIMITY.

You can learn a lot by listening to a rabbit chase. You can tell if the trail is hot or cold by the way the rabbit dogs sound off—the chopping licks of a dog on a fresh track, the arioso bawls of a beagle simply on the hunt. You can tell if the rabbit is going or coming. You can tell if the hound pack is thrown off the hunt, coursing the woods and thickets with confusion, or focused on the only thing that matters to a beagle in the brush: the smell of rabbit in its muzzle.

You can also learn a lot by listening to the Taylor clan chase rabbits. The family—patriarch Ed Taylor, his brother Bill and son Dungee—has been chasing northern Piedmont cottontails for decades and chases them still. These days, Dungee takes the lead. The owner of a moving company in Durham, he racks up thousands of miles each hunting season, criss-crossing Granville, Vance and Warren counties. Dungee is a big man, with a big smile and a big voice and a big way of running rabbits. Dressed in denim overalls and a red sweatshirt, he turns briars away with a grin and demands that his dogs match him in enthusiasm.

Written by T. Edward Nickens & Photographed by Erika Larsen

The Taylors' pack of beagles attentively awaits their release in search of well camouflaged cottontails.

MASLOWSKI PRODUCTIONS

His father, Ed, seems to be in constant motion. He carries a double-barreled shotgun and wears Carhartt overalls and doesn't talk much. At least, if he does, you can't hear him. He prefers the deep woods, not the field edges. He grins, slaps his gun stock, and the next time you see him, it's time for lunch. Bill sports trim, lambchop sideburns and a canvas duck hunting coat ripped to pieces. His orange hat has earflaps turned down against the chill. He's out for the fun of it all—the dogs, the races, the open country. There was a time when a rabbit chase meant either meat for the table or thin soup for supper. No longer.

With hounds in pursuit, a rabbit first pours on the speed to gain ground and a little bit of thinking room. That's when the fun begins. Cottontails are notorious for their cunning when chased, and their daring tricks to throw off the dogs are legendary.

"I've seen them do crazy things," Dungee tells me as we break through a thicket to find a clearing for a stand. "Those rabbits will run full-bore for a few hundred feet, then hop to the side and squat down tight as the dogs race by just a hand's width away."

A rabbit on the run will suddenly spin 180 degrees, step to the side of its trail and come running right back at a pack of tonguing dogs too intent on scent to notice the bunny. "He'll lick his feet real good to clean them off, then tip through the woods to sit up by some tree, and the dogs will never find him," Dungee says. Swamp rabbits will lie underwater, alligator-style, with only their eyes and noses above the surface. Rabbits squirt through hollow logs, then hop to the top of the fallen trunk and head the other way, leaving a dead-end trail for the dogs.

The rabbit has speed, wiles, camouflage, incredible capacity for strategic thinking and a decided home-court advantage. The one big black mark against it is its propensity to return to where it was jumped. If it wasn't for such a strong fidelity to home, no one would know what hasenpfeffer is.

That's not a problem with the Taylors. "When I drop the gate, I want the dogs in the woods running," Dungee says. "We're here for a reason."

And the reason is rabbit. On a bitter February day, the Taylors dropped their gates southwest of Henderson. Listen to the music.

Dungee Taylor My granddaddy's name was Herbert. He was a big-time hunter and ballplayer. Grew up in Townsville, then bought the farm where I was born and raised. He was a pig and cow farmer. That's where I learned to milk cows.

He used to hunt rabbit dogs and coon dogs just the same. Hunt the rabbits during the day and run the same dogs on coons at night. And they knew the difference. He would take me when I was 6 or 7 years old, sit me on a stump and say, "Stay up against that tree now, when you go to shoot!" That was because that old 12-gauge single-barrel would kick so hard it'd knock me down. Oh, that was a long, long time ago.

So I just fell in love with it. I went hunting four or five times before I killed my first one. He was coming straight to me, and that's the hardest one to shoot. You gotta shoot down at the ground. You shoot at him, he's gone.

Uncle Bill We moved to that farm on a government program. We got 100 acres of land and

had to meet the qualifications. You had to have your own team of mules or horses, and you had to can 50 quarts of some kind of fruits or berries, as well as 50 quarts of vegetables. They didn't give you the land; we paid $5,000 for it. But each fall and winter my mother and my father would have to fill out papers to prove that they had met the standards.

Ed Taylor Oh, but back then we had so many more rabbits. You couldn't walk hardly anywhere without getting them up.

I fight through curtains of thorny smilax and blackberry, trying to keep up with the hounds. The beagles worm through briars so thick a breeze couldn't sneak through, an entire dog pack reduced to white-tipped tails semaphoring in the brush. Good rabbit dogs rely on their eyes as much as their noses. At times I can see them looking for game; they burrow their snouts into every nook and cranny, then suddenly their heads are up, eyes dissecting the thicket for any sign of a rabbit. The tip of Rip's tail is sheared hairless and crimson with blood. I can hear their heavy snorting as they siphon the air for scent.

When I drop the gate, I want the dogs in the woods running. We're here for a reason.

Dungee Taylor My dad and Uncle Bill, back then, now, they were rabbit hunting for food.

Uncle Bill We were hunting for the P-O-T, yes, sir. And for fun; it was a combination. We hunted opossum, raccoons, squirrels, rabbits, birds—quail, any kind of bird big enough to clean. My mother would make up a bird pie. Get all the feathers off of 'em, put 'em in a little water with a little onion and boil it, roll out a pastry, take the birds out and cook up a pie.

Now, when I grew up, we couldn't afford shells. Sticks and rocks, that's what we used, and the dogs would run 'em so hard, sometimes they would go in holes. I don't mean we didn't have any shells at all, but if there was any possible chance of getting him without shooting them shells, you'd try it.

I was hunting rabbits when I was knee high to a duck. Oh, yes. My daddy's boots near 'bout came to my waist. Oh, it's in the blood. I love it. Yes, sir. Yes, sir.

The ingredients for a successful hunt are few: men, dogs, guns and good cover filled with rabbits.

The reward for the beagles' hard work is a close-up sniff of their fleet quarry. For the hunter, on occasion, the reward is a new lucky rabbit's foot.

I was hunting rabbits when I was knee high to a duck. Oh, yes. My daddy's boots near 'bout came to my waist. Oh, it's in the blood. I love it.

Dungee Taylor Everybody's different, of course. Everybody's dogs is different. Me, I just can't stand still. I gotta be moving. That's why I own a moving company. I gotta be moving. That's how my dogs are. Just leave other dogs behind. They know what to do. I don't even have to get in the bushes. My dogs get out of the truck, and they're ready to be gone. *YoYoYoYoYoYoYo!* They know that's what I want to hear.

Uncle Bill His dogs are sweeping dogs, you see. They run with their heads up, like foxhounds, sweeping the woods. My dogs run on the track. They're slower, but that's OK. That rabbit, see, oh, he's hard to find. And you've got to have good dogs to stay with him. That's the trick. Stay on the track.

They're hot onto something, but it seems to me that they've covered every square inch of ground to no avail. Then Cassie, Dungee's "A-number-one jump dog," suddenly pushes a bunny from its bed not 10 feet from my bootlaces. Cassie opens up with a bawling, clangorous cry. In seconds the rest of the pack honors the find, rushing to the hot scent. Rip booms out a guttural bass line of affirmation. PeeWee and Blondie add their high-pitched chop to the chorus. The pack is off, and the race is on.

Dungee Taylor Some people like slower dogs. My daddy's dogs, Blondie, Dogwood, Tom, they are fast, a little like my dogs. It's just my opinion. I'm like this: If the rabbits get up and goes across here, I don't want the dogs to be

going *yo . . . yo . . . yo.* I want mine to be wide open. *YOYOYOYOYOYO!* No reason to stand right here—*yo . . . yo . . . yo*—because that rabbit ain't right here, he's gone. You need to get on that track and push him on down the road. That's what I like to see.

Here's something else that not everybody agrees to: I don't like to shoot a rabbit as soon as he gets up. If my dogs can't stay on that rabbit and run him around one or two times, or three or four times, well, there's no sport in shooting him on the jump. Rabbit don't have a prayer, and the dogs get the thrill from the running. That's what they enjoy doing. If the hunter goes "*bam*" and kills the rabbit right off, the dogs are saying, "Heck-fire! I ain't had no fun yet, and here you are taking it away from me."

Uncle Bill Yes, sir. But you see, back then, our dogs were poor. Hungry. And they would run the daylights out of anything, and if he didn't have a hole or something to go in, they'd catch him. And the rabbits knew how hungry them dogs were, and they'd go in a hole and that's what you wanted him to do. We'd just dig him up. We carried an axe, too, and that rabbit run in a hollow tree, we'd cut it down. Or use that bamboo briar, hook into the hair, and pull him out, bit by bit, twist and pull, until you could reach in there real easy, find them hind legs, and then he's yours.

Dungee Taylor Well, I don't like my dogs to lose a rabbit. If they cut off and lose a rabbit, then I'll get in there and find where they lost the track, and get in there and work with 'em and talk to 'em and hunt with 'em until they find that rabbit, and then they keep going again. And if you keep doing that, that's how you have you "A-number-one" rabbit dogs. If you don't care, and once they lose him you go and jump another one, then your dogs learn, hey, no big deal. When it gets hard, you want them to work that much harder to find him.

Hound music tells me a rabbit is headed my way, and fast. I take up a stand at the intersection of two trails for a clear shot through the underbrush, and grip my gun. The dogs are in full cry, baying like a dozen cars locking up the brakes, moments before impact. I take a few steps back towards the woods to hide my silhouette, and that's when the rabbit squirts out of the brambles at 3 o'clock. It gives me a glancing look with a liquid-black eye, then leaps across the trail. My shotgun bead points at an empty spot in the woods. Now the bunny takes two hops and spins like a top, ducks into the brambles and is gone. Just like that.

The dogs boil through the woods, Dungee fast on their heels. Everyone gives us a look. There will be more rabbits to come, and a few that aren't so lucky. But for now we haven't fired a shot, and all we can do is grin with sheepish admiration.

Dungee Taylor That rabbit, now, he's a smart one. He's a smart one. Don't think he ain't. ◆

T. Edward Nickens is an editor-at-large at Field & Stream *and a regular contributor to* WINC.

A BEAGLER'S DOZEN: WORDS TO THE MUSIC

JUMP DOG: A dog known for its ability to find and jump a bunny from its bed. Also called a strike dog.

TRACK DOG: These dogs are single-minded and persistent—when the scent trail goes cold, they stay the course, working the track close to figure out where the rabbit ran. Also called a trail dog or picker.

SWING DOG: When the pack loses the trail, these dogs range back and forth in an attempt to pick up the track. A good pack will have both track dogs and swing dogs.

LINE CONTROL: The ability of a dog to stay close to the scent trail.

TONGUING: The special voice of a rabbit dog on scent. A dog's tongue will change due to changing conditions on the trail.

CHOP MOUTH: A short, choppy, staccato style of tonguing, also called machine-gun. Opposite of "bawl mouth," characterized by a big, booming tongue.

TIGHT MOUTH: Describes a dog that tongues only when on scent. Also, "clean mouth." But sometimes used for a dog that doesn't tongue sufficiently when on trail.

BABBLING: When a hound tongues or "opens up" indiscriminately.

CAST: To turn the dogs out, or to put the dogs in a hunting situation. It can also mean a single dog hunting intensely for a rabbit, as in "the beagle cast back and forth."

GONE TO GROUND: A rabbit that disappears into a hole or burrow has "gone to ground."

CHECK: When the dogs lose the scent trail. Also used to describe a change of course or tactics employed by the rabbit.

TAILING: Describes dogs that look at their packmates to see what they are doing, instead of hunting on their own.

Survey team leader Ryan Heise releases a robust redhorse back into the Pee Dee River.

IN SEARCH OF THE ROBUST REDHORSE

WRITTEN AND PHOTOGRAPHED BY TODD PUSSER

Research on this mysterious, odd-looking river denizen finally reveals some of the creature's range and behaviors.

Staring into the murky brown waters for more than two hours, I found my concentration waning. I tried hard to stay focused on the task at hand, but my eyes kept wandering from the surface of the river to the skies above. Rising on a hot air thermal, high above the riverbank, was a Mississippi kite, the 12th such bird I had seen that day. The raptor, an uncommon breeder in North Carolina, disappeared over the tree line a quarter mile away, leaving me wondering if a population of the beautiful birds nests along that stretch of river.

Sitting on a large rock in the middle of river was a pair of yellowbelly sliders, shells glistening as they soaked up the rays of a mid-May sun. An hour before, a river otter was observed playing along the shoreline, oblivious to our presence. Certainly this part of the Pee Dee River contains an abundance of wildlife, all of which was more than a little distracting for a naturalist trying to help locate a most unusual species of fish.

Above, wildlife biologist Rob Nichols scans the river for fish brought to the surface by the electrofishing boat. Below, wildlife technician Nick Shaver weighs a grass carp, one of the many species found while searching for robust redhorses. Opposite page: Biologists measure and tag a redhorse for tracking purposes. Lower right: a juvenile robust redhorse.

Earlier in the morning, I joined aquatic biologists with the N.C. Wildlife Resources Commission and Progress Energy on a survey for a large, rare freshwater fish known as the robust redhorse, a unique member of a family of fishes known as suckers. The creature was lost to science in our state's waters for more than 120 years before an individual was caught in 1985 south of Blewett Falls Dam on the Pee Dee River near Rockingham. Since that time, only a handful of robust redhorses have been captured in North Carolina waters. Our plan was to survey a stretch of the Pee Dee south of U.S. 74 in Richmond County down to the South Carolina state line in an effort to locate further specimens of the redhorse and gain some insight about the population size of the rare fish.

The survey team consisted of Mike Swing and John Crutchfield, both environmental specialists from Progress Energy; Chris Nelson, Rob Nichols and Kandi Zinn of the Wildlife Commission; and David Wilkins, an aquarist with the South Carolina Aquarium. Leading the survey team was Ryan Heise, aquatic nongame coordinator for the Wildlife Commission, who has studied endangered freshwater fish in many areas of the southeastern United States.

The team split into three groups, each boarding a small johnboat fitted with an outboard engine and a small electric generator mounted on the stern. The generator is used to pump electricity into the surrounding water via two spiderlike anodes on the bow of the boat in a process known as electrofishing. Once in the water, the anodes release up to 1,000 volts of electricity, which momentarily stuns but does not kill the fish. Once stunned, the fish remain motionless at the surface and can be dipped up with nets, brought onboard and identified.

Donning rubber gloves to avoid being shocked, I joined Swing and Zinn on the largest of the three boats. Swing, who has worked with Progress Energy for several years, knows the Pee Dee River intimately. With anodes lowered, he immediately steered our boat to a shallow shoal in the middle of the river, where the current whipped rapidly

over hidden rocks and tree limbs. He cranked up the generator, and almost immediately, fish began to dance at the surface. Largemouth bass, shad, longnose gar, sinewy American eels, channel catfish and the occasional striped bass all floated on their sides near the spidery tentacles of the anodes.

Suddenly, a large fish weighing more than 20 pounds caught my eye as it rolled belly up at the surface just 10 feet away from the boat. A quick scan of the large, cream-colored scales told me it was a grass carp, an introduced species from Southeast Asia. Swing maneuvered our boat around the rocky shoal, and more grass carp floated to the top. Next to surface was a large flathead catfish, another introduced species that feeds heavily on many native species of fish, including our target for the day, the robust redhorse.

Suddenly, Zinn plunged her dip net into the water and pulled up a reddish-colored sucker that looked like the fish we were seeking. "Shorthead," shouted Swing over the drone of the generator. Shorthead redhorses (*Moxostoma macrolepidotum*) are fairly common in that section of the river and can resemble the robust redhorse in size, shape and color. With a flip of her wrist, Zinn dumped the stunned fish back into the murky water, and we continued our survey.

A CONFUSING PAST

Somewhat like an aquarian version of the ivory-billed woodpecker, the robust redhorse was unseen for many years before one was finally located by biologists working in the field. How the species was rediscovered is one of the most confusing and interesting reads in the annals of ichthyology.

The robust redhorse was formally described in 1870 by Edward Drinker Cope of the Philadelphia Academy of Natural Sciences. Cope, the most prominent natural historian of the time, acquired an unusually colored sucker fish from the Yadkin/Pee Dee River south of Winston-Salem, to which he gave the scientific name *Ptychostomus robustus*. His brief, two-paragraph description of the fish constituted the only words published on the species for more than 120 years. Unfortunately for laymen and scientists alike, the robust redhorse closely resembles other suckers found in Southeastern rivers, and

Somewhat like an aquarian version of the ivory-billed woodpecker, the robust redhorse was unseen for many years before one was finally located by biologists working in the field.

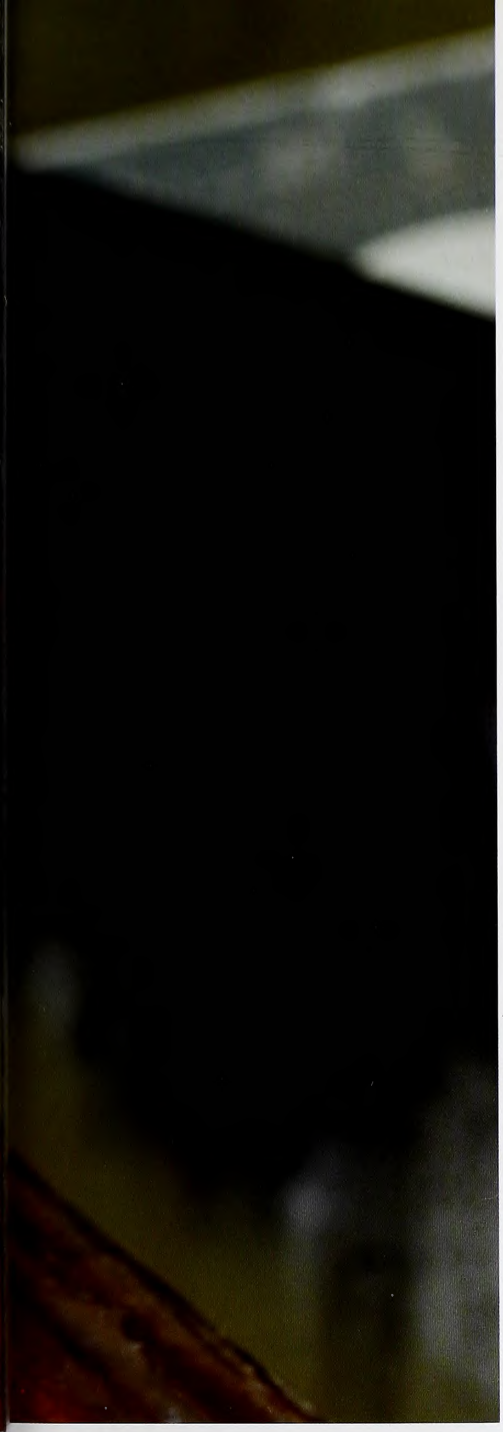
The redhorse's odd-looking mouth immediately identifies it as a sucker fish. The "inferior mouth" shape (see pages 33–34) indicates that it feeds on the river bottom.

later biologists misinterpreted Cope's description and placed the scientific name *robustus* on a related species, the smallfin redhorse.

In 1985 an unusual redhorse was captured in the Pee Dee River near Blewett Falls Dam and sent to Robert Jenkins, the world's leading authority on redhorse suckers, at Roanoke College in Virginia. The fish resembled no species known at that time and was a bit of an enigma for Jenkins. He petitioned his colleagues throughout the Southeast to send him any unusual redhorses they encountered in the field. Before long, other fish came in from the Oconee and Savannah rivers in Georgia that resembled the mystery fish from the Pee Dee.

After painstakingly describing every detail of the fish and comparing them with the 25 other species of suckers found in the mid-Atlantic region, Jenkins realized that all of the unusual fish were the true robust redhorse species described by Cope 110 years earlier. Jenkins and others published a paper on his findings, giving the scientific name of the robust redhorse, *Moxostoma robustum*, in order to distinguish it from the smallfin redhorse, with which it was long confused.

Remarkably, 15 years would pass before another robust redhorse was captured and documented in the Pee Dee River of North Carolina in the spring of 2000.



A UNIQUE FIND

Back and forth across the river, we continued our search. The boats were evenly spaced on the river, one on the eastern bank, one on the west, and our boat working the rocky shoals in the center. Just after 11 a.m., Heise radioed that his boat had captured a robust redhorse and had placed it in a holding tank. Upon hearing the news, Swing turned our generator off, and we moved over to the edge of the river to meet with the other members of the team.

Pulling my camera out of my bag, I shot photo after photo of the prized fish as Heise moved it from the holding tank onto our boat to be worked up. What immediately impressed me about the fish were the reddish bronze scales on its back and its red pelvic and anal fins. No wonder it is called a redhorse. Its disproportionately large mouth with even larger lips appeared almost cartoonlike. Heise informed me that the species has large, molarlike pharyngeal teeth that it uses to crush hard-bodied prey such as mussels, a preferred food item. No other redhorse sucker species in Atlantic slope rivers has these modified teeth.

The rest of the afternoon, we searched back and forth across the river but failed to turn up another robust redhorse.

Heise scanned the fish with an electronic scanner and discovered it was a large female that had been caught the previous day some 2 miles north of our present location. He knew this because a small PIT (passive integrated transponder) tag was inserted into the abdominal wall of the fish. The PIT tag, about the size of a grain of rice, has an imbedded bar code that the scanner reads. Placing the redhorse on the scales, we found it weighed 18 pounds. It measured over 30 inches in length, making it the largest specimen ever captured of the species. After everyone had shot photos, Heise leaned over the side of the boat and gently released the fish back into the brown waters of the river.

The rest of the afternoon, we searched back and forth across the river but failed to turn up another robust redhorse. At 5 p.m., we pulled our boats from the water near Cheraw, S.C., and called it a day.

NEW DISCOVERIES

Based on archaeological evidence, the robust redhorse was once common throughout rivers of the Carolinas and Georgia. As humans settled the region, the species began to decline. Scientists believe that the building of dams and impoundments resulted in habitat loss and disruption of spawning migrations, and sedimentation and pollution caused deterioration of water quality. Predation by introduced nonnative species such as the flathead catfish also is thought to have contributed to the decline of the species. Since its rediscovery in 1985, efforts have been made to raise the robust redhorse in captivity in Georgia in an effort to restock the fish throughout its historic range. It will take scientists many years to determine if this strategy will work to increase the overall population size. In addition to the breeding and reintroduction projects, efforts are underway to assess the genetic diversity of redhorse populations in the Oconee, Savannah and Pee Dee rivers. Biologists hope to describe DNA differences between the various species of redhorses found in the region.

In North Carolina, the future of the robust redhorse looks optimistic. During April and May 2006, Heise and his team captured 15 adult robust redhorses from the Pee Dee River. Each fish was tagged, and 10 individuals were surgically implanted with radio tags. This telemetry study, the first of its kind in North Carolina, has enabled Heise to make exciting discoveries about the redhorse. He has documented spawning locations for the species along the Pee Dee near Blewett Falls Dam and in an area known as Jones Creek Shoal, near the South Carolina state line.

The tags have shown that the fish are capable of long-distance travel. Since May, an adult female fish moved more than 60 miles down the Pee Dee River to an area near Darlington, S.C., the longest distance traveled by any of the radio-tagged fish. Four other fish have also moved into the Coastal Plain of South Carolina, while 10 individuals have stayed in the Piedmont section of the river near Blewett Falls Dam. The data set is still in its early stages, but Heise is confident that it can be used to help protect the species for generations to come.

Listening to Heise talk about the progress of the robust redhorse research, I am elated at having had the opportunity to observe one of the rarest species of fish in North Carolina. In a world of declining biodiversity, it is nice to know that a large, scaled red fish with huge lips and strange molars still swims our state's inland waters, even if it is a rare, elusive species that few will ever get to see. ◆

Todd Pusser is a marine biologist and a regular contributor to Wildlife in North Carolina.

Burt Spiller
SOLD ME A BILL OF GOODS

A FLATLANDS YOUTH DISCOVERS THE HARD FACTS OF GROUSE HUNTING IN NORTH CAROLINA'S MOUNTAINS, BUT LEARNS TO LOVE THE SPORT ALL THE SAME.

Many years ago, when I was in high school, I read a remarkable little book written 40 years earlier by a gentleman named Burt Spiller. The book was "Grouse Feathers," Mr. Spiller's paean to that glorious denizen of the thicket, the ruffed grouse. In this wonderful tome, he painted a picture of sincere, skilled, genteel sportsmen pursuing their fan-tailed quarry with fine double guns and sagacious setters through gentle landscapes clothed in aspen thickets and alder bottoms. Through his prose, I saw grouse blast out of sun-dappled, golden aspen cover. In my mind, I tracked them with an elegant side-by-side and neatly folded them over the popple tangles. I was hooked—I would be a grouse hunter.

WRITTEN BY CLYDE E. SORENSON & ILLUSTRATED BY JEFF CHRISTIAN

Unfortunately, I lived in Albemarle, where there are no grouse, and where there probably haven't been any since the last ice age. Since I was a lad of rather modest means, with no car and only a single-shot shotgun, it would be some time until I could put together the necessary components of the classic Spilleresque grouse hunt. But I could educate myself, so I read everything about grouse hunting I could get my hands on. Early on in my research, I discovered that, although there were no grouse in my immediate neighborhood, there were grouse in the mountains of North Carolina. I resolved to take advantage of this fact at the first possible opportunity.

Opportunity finally got around to raising its tardy head my sophomore year at N.C. State. One of my hallmates, Mike Sanders, was a wildlife biology major like me. Mike came from up in the mountains near Franklin. He hunted squirrels and rabbits but not grouse. However, he had seen them on his uncle's land (they called them pheasants), and he was fairly certain we could find some. After much discussion, Mike and I and a couple of our friends on the hall, Don and Wally, set out on a long-awaited grouse hunting expedition to the mountains. We would drive up on Friday, hunt all day Saturday and head back to Raleigh on Sunday.

Our anticipation grew as we closed the distance to the mountains on our long journey to the Nantahala. We would not have a dog to hunt over, though many of the books I read said we could hunt grouse effectively without a canine assistant. But we had everything else: We all had suitable guns (I had moved up to a double barrel—a side-by-side, in fact), and Don and I brought our briar pipes to help develop an appropriately genteel atmosphere. All of us had the same grouse-laden expectation, born of the same source—the writings of Burt Spiller and his ilk (and perhaps more than a little overzealous promotion from yours

truly). That night, we dreamed of mahogany rockets bursting out of golden thickets and of heavy birds falling through the branches.

That's not quite the way it went.

A promising start

We started out the next morning full of spit and vinegar. The day was cool but not cold, with a clear sky above the ground fog. There was virtually no wind, and it looked like it could be a perfect day for a hunt. We parked on the side of a little dirt road that ran along the foot of Mike's dad's land, and we took off up an old logging road. Soon, the road forked; Don and I went up one side while Wally and Mike took the other. Our fork angled up through the bottom of a rhododendron "hell" and then crossed a spring branch. On the other side of the branch it went straight up the mountain. It looked more like a giant, muddy sliding board than a road. Along both sides, blackberries and ferns stood in dense, tawny ranks.

Don and I crossed the branch and started up the hill, pausing every 30 or 40 yards for a brief breather because our flatlander lungs felt like they might explode. Frankly, shooting at a grouse became a diminishing priority as we struggled up the incline.

Along about our fourth stop, Don wondered aloud, between gasps, "What are those?" and pointed at two forms hunched in the blackberries immediately to our left.

"Grouse!" I blurted. The birds crouched less than 10 feet from us, looking more like chickens than wily denizens of the woods. This wasn't what we prepared for—they weren't supposed to be stupid and tame. What should we do now?

We held fast in a standoff with the birds for several minutes. They alternately looked at us and picked at the frost-blasted blackberry leaves around them. What to do, indeed! Directly, we heard a shot above us. The birds both momentarily sleeked, and then resumed their original, goofy, barnyard-fowl stance. Wally and Mike came into view 50 or so yards up the hill, with Mike toting a little red squirrel. I frantically motioned for them to stop and hoarsely whispered, like an idiot, "Grouse! Grouse!" After some more wild hand gyrations signaled a plan of attack, we prepared to flush the birds, certain we had them dead to rights.

Woods chickens and brown bombers

I took one step in their direction, and both grouse crouched. Don took a step, and they didn't move, although one had his beady little eye leveled right on my eyes. I took another step, and suddenly, and with great velocity, the birds rocketed upward, in an instant transformed from silly woods chickens to brown bombers. Immediately, miraculously, each bird put trees between it and us. Four shots from us, two shots from the lads up the hill; nothing to show for it but damaged timber. The birds twisted and rocked their way into a laurel slick on the side hill across the bottom. All thoughts of aching lungs disappeared. Our manly honor had been besmirched, and there was a score to settle!

We formulated a strategy: Don would skirt the bottom of the slick, Wally and Mike

would skirt the top and I would charge through the middle. How could they possibly escape? We started through the slick, each step guarded, arms at the ready. I soon discovered that "charging through a laurel slick" is an oxymoron—moving through these tangled thickets is inevitably a painfully deliberate process. Halfway through the slick, Mother Nature forcefully reminded me that I drank two cups of coffee and a large Mountain Dew before we started the hunt. I stopped, propped my gun safely against a rhododendron and turned to answer the urgent call. Midway through the process, out of the corner of my eye, I caught a glimpse of motion from uphill; a brown form glided silently behind me, within an arm's reach. I felt the breeze from its passage on the back of my neck. I quickly grabbed my gun (not a terribly good idea given the task occupying me a split second earlier), spun around and leveled the firearm at the bird, but it was too late; the grouse sailed back across the bottom to the thicket it had left earlier. Perhaps during those long minutes we faced off with the birds before the first flush, they weren't idly killing time; perhaps they were simply working on escape tactics.

We continued through the thicket, and the other bird departed like the first, silently, but this time far out of range of any of us, from the top of a white pine thrusting out of the slick. We spent the next hour and a half trying to relocate them without success. Wally, Mike and Don were rapidly losing enthusiasm, as our legs turned to Jell-O on the steep hill and briars slashed our skin. After a bit, my friends were quite content to accept the insult to their manhood, pack up their kit and go back to Mike's mom's house for lunch. I elected to forge on.

Only invisible roars

I decided to carry the battle uphill and found a stand of regenerating white pines grown up to all kinds of birdy vegetation. I flushed four birds there, but never saw any—each was just a brief jet roar from the other side of a tree. I eased farther along the road. Near another bramble tangle, a bird went up in plain view, and I missed it with both barrels.

I saw another patch of regenerating clear-cut across a large hollow and headed for it. My route carried me across a very steep side hill through a mature, open stand of timber. It was steep enough that I often had to grab at tree trunks to remain upright. All the books suggested that this was not good grouse habitat, so I concentrated on traversing the side hill. Halfway across, a grouse flushed from the uphill side of a large oak. I swung on the bird and pulled the trigger. The recoil knocked me over, and I found myself sliding downhill headfirst on my back. Fortunately, the crown of my head found another large tree, abruptly stopping my descent. I began to understand that if the grouse couldn't wear me down or humiliate me into leaving, they were going to kill me. I decided it would be prudent to watch my back.

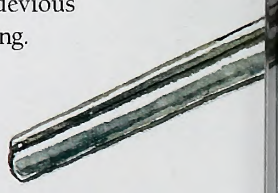
I continued to struggle from thicket to thicket and back again. Eventually, I accumulated 13 more flushes and shot six more times, and I never cut a feather. I was drenched in sweat despite the cool temperature, and the muscles in my legs screamed in agony. The skin on my arms, face and thighs was lacerated and bleeding, and I had a lump the size of (what else!) a grouse egg on the top of my head. At 3:30 in the afternoon, I admitted defeat.

I couldn't speak to the conditions up North, in Mr. Spiller's country, but I was ready to testify about grouse hunting in the mountains of North Carolina. Here, it was not the least bit genteel. It was hot, painful, frustrating work fit only for lunatics, and a pound and a half of stringy bird meat was not enough reward. I clambered to the top of the hill and found the logging path that led back to the car. At the crest I stopped, sat down on a rock, smoked my pipe (one last bitter tribute to Mr. Spiller) and slowly headed down the mountain.

An accidental success

The farther I descended, the deeper I fell into self-pity. I limped along, going over all the mistakes I had made and all the accidents I had endured. I resolved that all my bird hunting from this day forward would be in flatter land, pursuing less devious creatures. Yep, I had had it with grouse hunting.

I approached an oak deadfall at the side of the logging road but paid it no mind. I was done. As I passed, though, there was a roar of wings. I instinctively spun and threw my gun to my shoulder.



There, in the afternoon light, glowed one more grouse, surrounded by falling beech leaves. I pulled the front trigger, and it fell to the ground, its wings momentarily vibrating on the forest carpet. I quickly laid down my gun and hurried to where it fell. It lay on its back in the fallen leaves, still and with its eyes closed. It was a beautiful animal—its plumage was remarkably soft, with bold bars the ruddy color of autumn oak leaves on its chest and flanks, and a warm speckled brown on its back.

And its tail! Its tail was a sight to behold: a broad red fan with the most intricate and subtle etching capped by a deep mahogany subterminal band. The band extended all the way across the fan, so I knew it was a male. I picked it up; it was remarkably solid and heavy. A short crest decorated its crown, and small soft feathers cloaked its legs and feet.

If hunting is done properly, there is always regret over the taking of a life, along with the excitement of ending the chase. This is one of the things that makes hunting important. Even though every human on earth is responsible for the deaths of fellow creatures, hunters are among the few in our modern world who have the opportunity to consider this fact through direct experience. This time, my remorse over killing the grouse was colored by chagrin at myself for forgetting that. I examined the grouse a bit more, smoothed its plumage and carefully laid it in my game vest. Unloading my gun, I limped on down the hill. One was enough this time.

I've been back to the hills almost every year since, with very little additional grouse meat to show for the effort, but tons of great memories. Maybe old Burt didn't entirely mislead me after all. I do wonder, though, what he would have made of a rhododendron hell. ◆

Clyde E. Sorenson is an associate professor of entomology at N.C. State University and a regular contributor to WINC.

NATURE'S WAYS

How Does A Ruffed Grouse Survive A Mountain Blizzard?

See Nature's Ways, page 39.

Ever wonder why fish come in so many different shapes? It's all about

Form & Function

written by Jeff Beane / illustrated by Consie Powell
nature activity by Anne M. Runyon

Fish come in a wide range of shapes and sizes. With some species, it's tempting to think that they might have been designed especially to fillet out nicely and fit into a frying pan! But fishes are shaped to meet their own needs rather than ours. Everything about a fish's shape reflects its way of life.

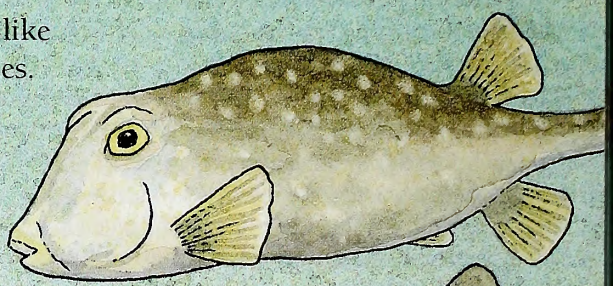
SARGASSUM FISH

BASIC BODY SHAPES

A fish's ability to move through the water depends largely upon its body shape. The fastest fishes—like tuna, mackerel and swordfish—are torpedo-shaped, or *fusiform*. Their streamlined, bullet-like bodies reduce drag as they pursue prey and flee predators.

Fishes that are flattened dorsoventrally (from top to bottom)—like stingrays, skates and goosefish—are said to have *depressed* bodies. They are usually adapted for life on the bottom.

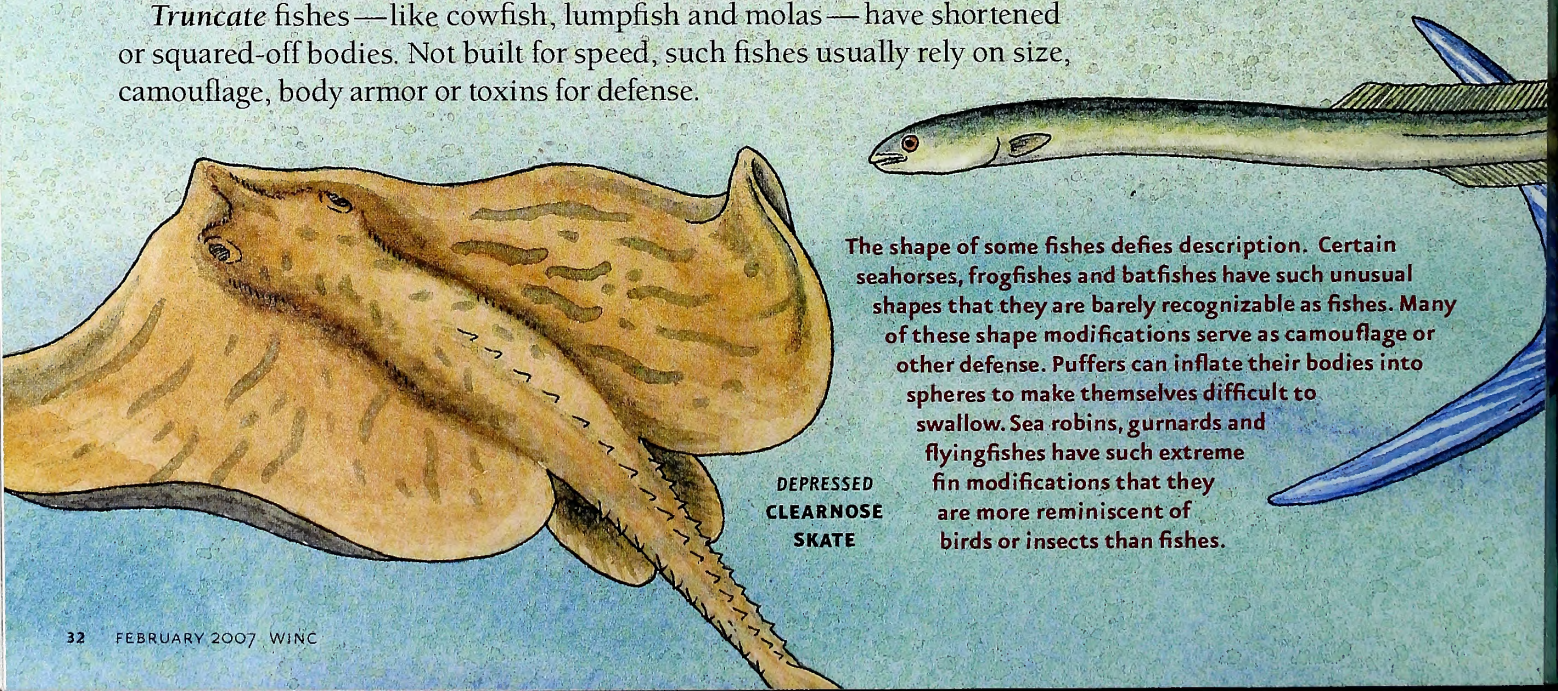
Fishes that are laterally (from side to side) flattened—like spadefish, lookdowns and many sunfishes—have *compressed* bodies. Most of these fishes are adapted for short bursts of speed and maneuvering quickly in thick cover. Flounders, by virtue of having both eyes on one side, are unique in using their compressed shape as a bottom-dwelling adaptation.



TRUNCATE
BUFFALO TRUNKFISH

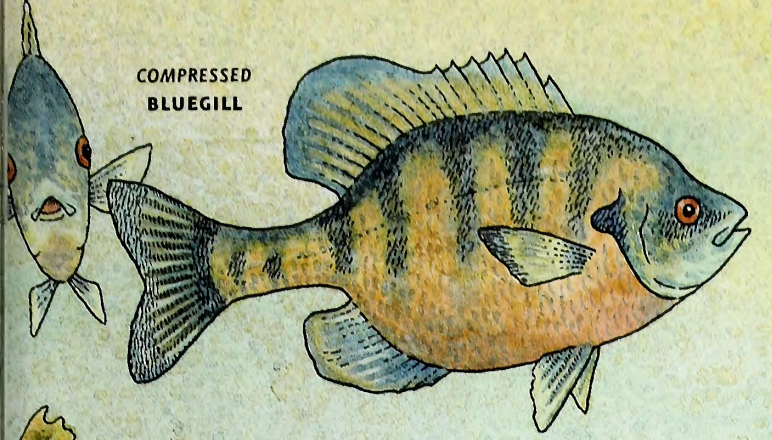
Attenuate or *filiform* fishes are long and slender, like eels, lampreys and pipefishes. They are adapted for burrowing into substrate or living in tight spaces such as rock crevices, coral caves or thick vegetation.

Truncate fishes—like cowfish, lumpfish and molas—have shortened or squared-off bodies. Not built for speed, such fishes usually rely on size, camouflage, body armor or toxins for defense.



DEPRESSED
CLEARNOSE
SKATE

The shape of some fishes defies description. Certain seahorses, frogfishes and batfishes have such unusual shapes that they are barely recognizable as fishes. Many of these shape modifications serve as camouflage or other defense. Puffers can inflate their bodies into spheres to make themselves difficult to swallow. Sea robins, gurnards and flyingfishes have such extreme fin modifications that they are more reminiscent of birds or insects than fishes.

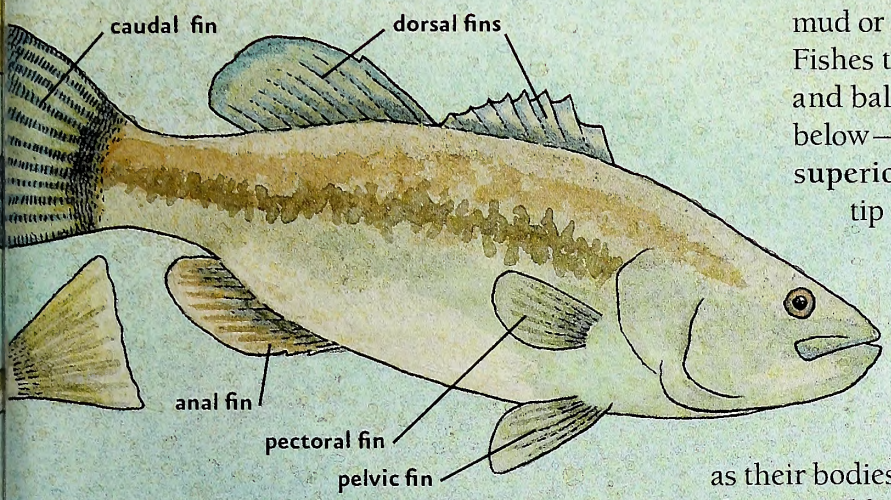


WATCH THAT MOUTH

The size, shape and position of a fish's mouth can reveal clues about how it feeds and what it eats. Many fishes—like trout, snappers, bluefish and most sunfishes—have a **terminal** mouth, opening straight ahead at the tip of the snout. Most fishes with terminal mouths feed either by directly seizing their prey head-on or by taking in water to filter-feed. An **inferior** mouth—like that of a sucker, sturgeon or carp—opens on the underside of the head and usually means the fish is a bottom feeder, gleaning organic material from mud or scraping algae from rocks or other surfaces. Fishes that feed at the surface—like topminnows and ballyhoo, or that ambush their prey from below—like stargazers and anglerfishes—have **superior** mouths that open dorsally, above the tip of the snout.

The caudal (tail) fin propels a fish forward and helps it steer.

Dorsal and anal fins usually act primarily as rudders, keeping a fish level in the water.

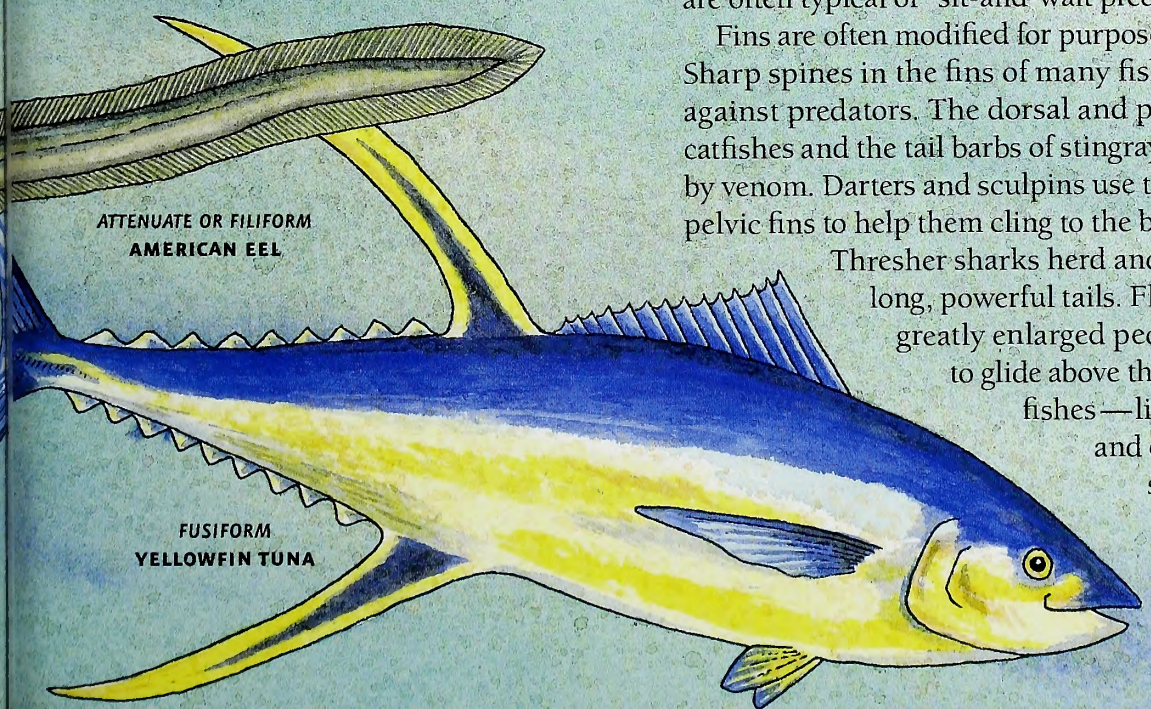


The pectoral and pelvic fins provide stability and are used for fine movement, helping a fish steer, maneuver and brake.

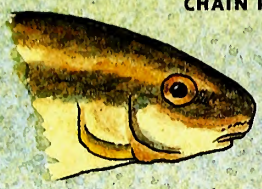
FIN FEATURES

The shape of a fish's fins can also reveal its lifestyle. Most of the faster fishes—like billfish, tunas and mako sharks—have fins that are as streamlined as their bodies, and tails that are **lunate** (deeply forked with narrow-bladed caudal lobes—i.e., shaped like a crescent moon). More rounded tails—like those of bowfin, toadfish and mud sunfish—provide more surface area for thrust, effective acceleration and maneuvering, but create drag and cause fishes to tire easily. Broad or rounded tails are often typical of "sit-and-wait predators."

Fins are often modified for purposes beyond the basics. Sharp spines in the fins of many fishes provide defense against predators. The dorsal and pectoral fin spines of catfishes and the tail barbs of stingrays are further enhanced by venom. Darters and sculpins use their large pectoral and pelvic fins to help them cling to the bottom of swift streams. Thresher sharks herd and stun prey with their long, powerful tails. Flyingfishes use their greatly enlarged pectoral and pelvic fins to glide above the water's surface. Many fishes—like mollies, blennies and darters—develop specially shaped or colored fins for mating rituals.



terminal mouth
CHAIN PICKEREL

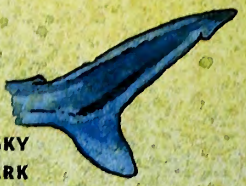


inferior mouth
SUCKER

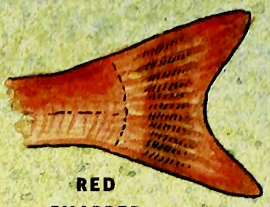
superior mouth
TOPMINNOW

DIFFERENT BODIES, DIFFERENT FISH

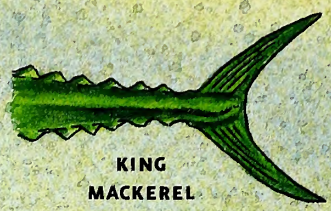
The more you think about fish shapes, the more they make sense. Think about a pickerel or gar. The mouthful of sharp teeth will tell you it's probably a predator, but also notice the elongated body, pointed head and fins situated far back on the body to provide thrust. Such features often indicate an "ambush predator" that can dart quickly out of cover to seize its prey. Consider how a relatively streamlined body, evenly distributed fins and large, terminal mouth help a largemouth bass or brown trout function as a "rover predator," actively searching for a wide variety of prey. Think how the deep, compressed body of a bluegill might help it hide in thick cover as well as make it hard to swallow, and how the fleshy barbels around a catfish's mouth help it find food in murky water. With a little practice, you can look at nearly any fish and make some good guesses about how it lives.



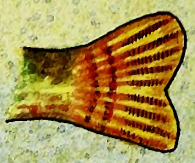
DUSKY
SHARK



RED
SNAPPER



KING
MACKEREL



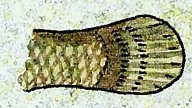
PUMPKINSEED

TARPON

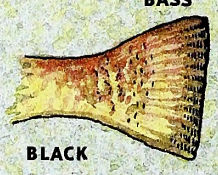
LONGNOSE
GAR

TRIGGERFISH

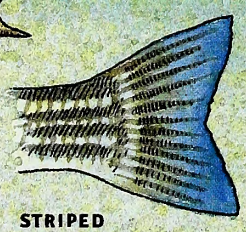
ROCK SEA
BASS



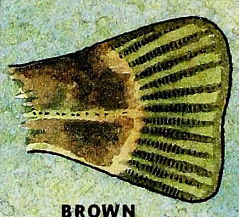
MOSQUITO
FISH



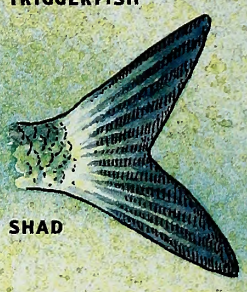
BLACK
DRUM



STRIPED
BASS



BROWN
BULLHEAD



SHAD

Get Outside

Next time you see a fish, pay attention to form and function—think about what the shape of its body and fins can tell you about how it lives. If you visit a stream or pond where you can observe wild fishes, an aquarium or even a seafood market, notice the different shapes and structures of the fish you see. If you fish for food or recreation, study each fish you catch and think about how its body shape helps it fit into its niche. Sketching fishes in a notebook can help you become familiar with them and appreciate the specialized shapes of each species or group. The three North Carolina aquariums (Manteo, Pine Knoll Shores and Fort Fisher) are excellent places to observe fish diversity.

Read and Find Out

- "The Freshwater Fishes of North Carolina" by Edward F. Menhinick, N.C. Wildlife Resources Commission, 1991.
- "A Field Guide to Atlantic Coast Fishes of North America" by C. Richard Robins, G. Carleton Ray, John Douglass and Rudolf Freund, Houghton Mifflin, 1986.
- "Freshwater Fishes of the Carolinas, Virginia, Maryland and Delaware" by Fred C. Rohde et al., University of North Carolina Press, 1994.
- "Fish Watching" by C. Lavett Smith, Cornell University Press, 1994.
- "Fish: An Enthusiast's Guide" by Peter B. Moyle, Univ. of California Press, 1993.

In *Wildlife in North Carolina*:

- "How Do Tunas Swim So Fast?" by Clyde Sorenson, April 2005.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

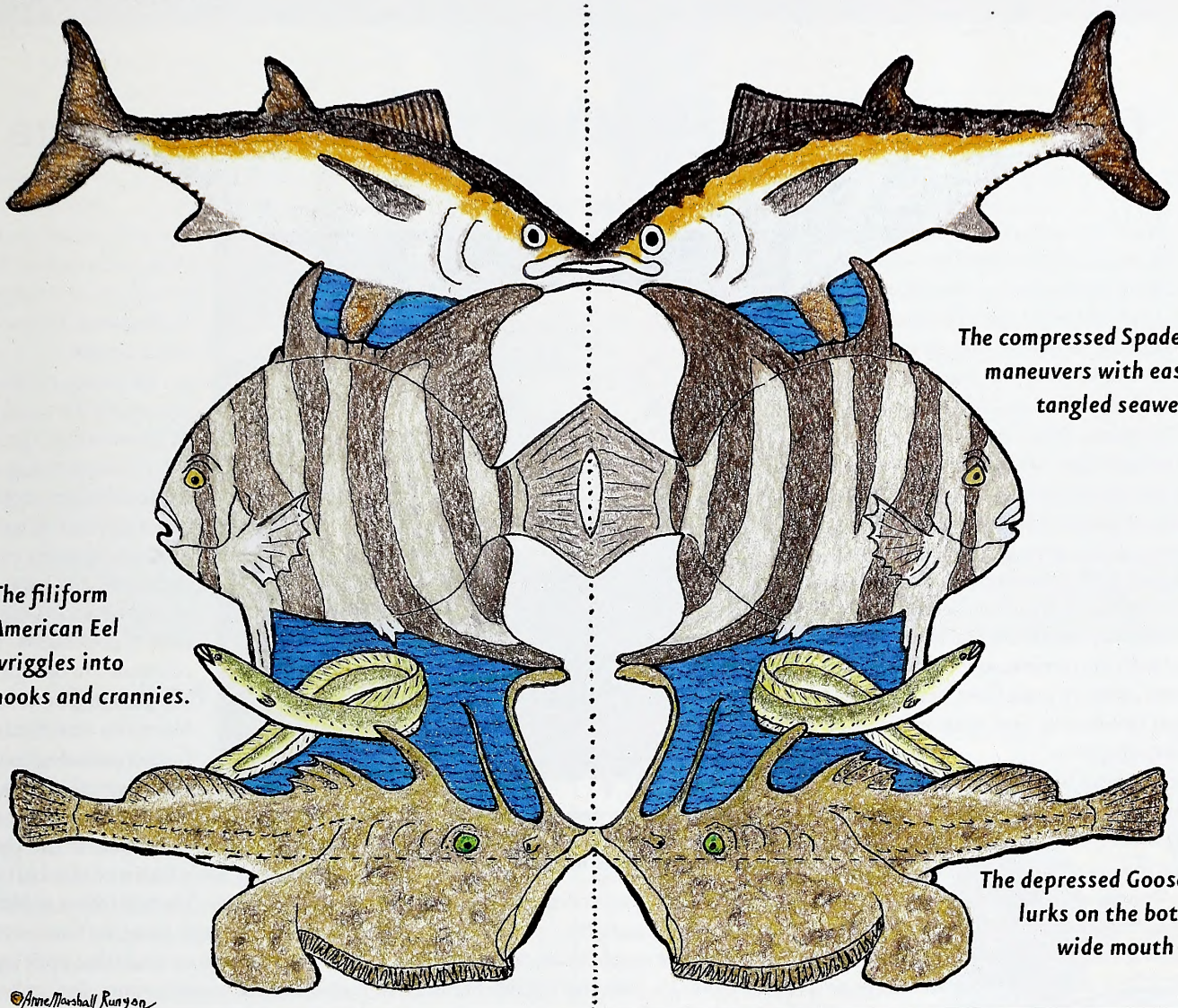
A Fish Form Paper Sculpture

The fusiform Blackfin Tuna swims fast and far in the open sea.

The compressed Spadefish maneuvers with ease in tangled seaweeds.

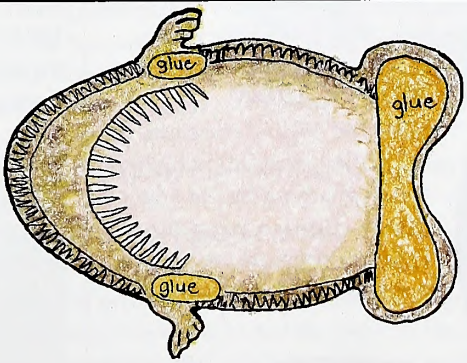
The filiform American Eel wriggles into nooks and crannies.

The depressed Goosefish lurks on the bottom, wide mouth ajar.



©Anne Marshall Runyon

1) Cut out box and fold in half along the ··· line.
2) Cut away white areas around your fish.
3) Glue Tuna's tail together, to hold fish together.
4) Cut out Goosefish's toothy lower jaw.
5) Fold up the two sides of Goosefish along the - - - lines, and glue lower jaw in place.
6) Pop a penny into Goosefish's mouth, and your Fish Form Paper Sculpture will stand tall.



lower jaw of Goosefish

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Endangered Mussels Suffer Mysterious Decline

Biologists working in the Little Tennessee River, home to what until recently was the healthiest population of the endangered Appalachian elktoe mussel (*Alasmidonta raveneliana*), are noting a seemingly inexplicable and dramatic decline in the population.

Biologists with the N.C. Wildlife Resources Commission have been surveying mussels in the Little Tennessee River between the town of Franklin and Fontana Reservoir for the past two years as part of a mussel reproduction study. During that time, they've noted a long-term decline in the number of Appalachian elktoe mussels and an acute die-off.

"It's baffling," said Steve Fraley, an aquatic biologist with the commission. "In a relatively short time, they've gone from being fairly abundant to relatively rare at the majority of our monitoring sites."

For every hour biologists spent looking for the mussels in 2004, they found 6.1 elktoes. In 2006, that number was down to 0.8. Some of the decline may be explained by mortality directly connected with the flooding from tropical storms Frances and Ivan, but since then, biologists have noted a continued decline. To confound the issue further, populations of five other mussel species surveyed in the same area at the same time appear stable over the same period, despite the tropical storms.

There is no obvious reason for the decline, though at this point biologists aren't ruling out anything — disease, parasites, toxins or stressors could have weakened mussels to the point that they succumbed to something that typically isn't a problem.

NCWRC

Biologists have yet to determine why elktoes have experienced such a dramatic decline in the Little Tennessee.

"It really is a sad situation," said John Fridell, the U.S. Fish and Wildlife Service biologist who listed the mussel as endangered in 1994. "The Appalachian elktoe had been making strides across the region, then Frances and Ivan struck, which negated some of those gains. Now we see this degree of a decline in what only a few years ago was the healthiest, most numerous population."

This past winter, biologists noted an acute die-off of mussels. This prompted them to send tissue samples to the U.S. Geological Survey and Virginia Polytechnic Institute looking for pathogens and parasites, but results were inconclusive. As mussel populations have continued to decline over the past few months, biologists may conduct further pathological and toxicological analyses.

Today, there are seven known populations of the Appalachian elktoe: in the Upper Nolichucky River basin of Mitchell and Yancey counties, the Mills River in Henderson County, the Little River in Transylvania County, the Pigeon and West Fork Pigeon rivers in Haywood County, the Tuckasegee River in Jackson and Swain counties, the Cheoah River in Graham County and the Little Tennessee River in Macon County.

If resources are available, biologists hope to conduct a detailed review of existing water quality data and increase water quality monitoring on the Little Tennessee River, looking for anomalies or trends that may be linked to the decline.

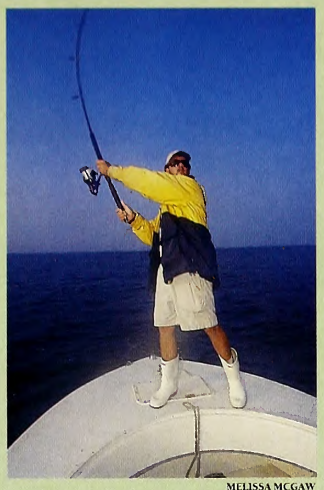
NORTH CAROLINA'S FEDERAL AND STATE ENDANGERED MUSSELS

Appalachian elktoe
Carolina heelsplitter
Dwarf wedgemussel
Littlewing pearlymussel
Tar River spinymussel

Striped Bass Remain Off-Limits in EEZ

After carefully examining a proposal to reopen offshore marine waters in the Atlantic Ocean for striped bass fishing, the National Oceanic and Atmospheric Administration (NOAA) has decided to maintain the 1990 federal closure.

NOAA closed marine areas in federal waters between 3 and 200 miles offshore—the Exclusive Economic Zone (EEZ)—to recreational and commercial striped bass fisheries to complement a rebuilding plan instituted in 1981 by the Atlantic States Marine Fisheries Commission (ASMFC). The rebuilding plan, supported by the federal closure, was successful, and scientists declared striped bass populations fully rebuilt in 1995. In April 2003, the ASMFC asked NOAA to evaluate available scientific information to determine if the federal ban should be lifted.



MELISSA MCGAW

After a 2005 stock assessment confirmed that the species is at a sustainable population size and not being overharvested, NOAA in April 2006 outlined potential management strategies to allow striped bass fishing to resume in offshore waters. These strategies included a range of options, from reopening the fisheries with minimum size and catch limits, to maintaining the federal ban.

NOAA's proposal did not call for an increase in the annual catch quota for striped bass, established by the ASMFC to maintain the population size. Even though the annual cap on catches would have remained the same, regardless of whether the fish were caught in nearshore or offshore waters, the majority of those who commented believed that reopening offshore fisheries would result in higher catches.

NOAA based the decision on a review of trends in the fishery and the species' population. The data show that there has been an increase in fishing mortality of striped bass and a decrease in female spawners since the ASMFC requested a reevaluation of the federal ban. Although the stock as a whole is not being overharvested, increased fishing pressure would likely result in overfishing. Since these issues would undermine the long-term conservation of Atlantic striped bass, the agency has determined that offshore waters should remain closed at this time.

"The recovery of the striped bass stock is one of the most important fishery success stories of our time, but it was a team effort," said Bill Hogarth, NOAA Fisheries Service Director. "The Atlantic coastal states, federal partners and the fishing community shared in the rebuilding process and now in maintaining a healthy, viable fishery. NOAA will continue to work with the Atlantic coastal states and user groups to reverse the current fishing mortality and female spawning stock trends."

Check Off for Nongame

North Carolina can claim more than 1,000 nongame mammals, reptiles, birds, amphibians, mollusks and crustaceans. Nongame wildlife includes all wild animals except those that can legally be taken by hunting and fishing. Many nongame species are common and can be viewed in your own backyard. Others are rare and seldom seen.

The Nongame and Endangered Wildlife Program strives to prevent species from becoming endangered through maintaining viable, self-sustaining populations of all native wildlife, with an emphasis on species in decline. The program is part of the Division of Wildlife Management of the N.C. Wildlife Resources Commission. Funding is provided in part by the N.C. Tax Check-Off for Nongame and Endangered Wildlife. The tax check-off enables North Carolina taxpayers to donate a portion of their state income tax refund to nongame wildlife conservation.

To contribute to the Nongame and Endangered Wildlife Fund, please enter an amount on line 26 of your North Carolina income tax form. If you are not eligible for a refund but would still like to contribute, send your donation to: Nongame and Endangered Wildlife Fund, 1722 Mail Service Center, Raleigh, N.C. 27699-1722. All donations are tax-deductible.

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

Since it began in 1983, the Nongame Program has funded projects to help sea turtles, bald eagles, peregrine falcons, freshwater mussels and many other native species.

ON PATROL

Wildlife officers Brent Ward and Nathan Green received a call from Sgt. Kelly Brantley about a possible violation. A man had entered a sporting goods store to purchase a hunting license. He also picked out some equipment before getting his license. The license was issued, and the man was told to pay for it at the front desk along with his other gear. The subject paid for the equipment but not for the license. The clerk who had originally issued the license noticed this and ran to the subject's car, which by now was backing out. She knocked on the window. The man looked at her, smiled and drove away.

ILLUSTRATED BY JACKIE PITTMAN

The clerk who issued the license happened to be Brantley's wife. She told Brantley about the incident, and Brantley gave Ward and Green the subject's address that he supplied in getting the license. A couple of days later, Ward and Green located the man at home. Ward asked the man if he had any idea why they were there. He responded, "No." Before Ward could say anything else, the man said, "Is this about the license I forgot to pay for? Can I pay you now, or do I need to go back to the store?" Ward advised him it was too late for that. The officers took his license, and the man was issued a citation for procuring a license to which he was not entitled.

CALENDAR OF EVENTS

FRIDAY–SUNDAY, FEB. 2–4

See the latest in fly-fishing gear at the Charlotte Fly-Fishing Show at the Charlotte Merchandise Mart. Exhibitors include St. Croix and Winston rods, Davidson River Outfitters, Madison River Outfitters and the N.C. Wildlife Resources Commission. Visit flyfishingshow.com.

SATURDAY–SUNDAY, FEB. 10–11

Check out the new 2007 N.C. Duck Stamp print at the 11th annual East Carolina Wildlife Arts and Decoy Carving Festival in Washington. Approximately 100 exhibitors will be on hand. The festival also features calling and carving competitions and retriever demonstrations. Call (252) 946-2897 or visit eastcarolinawildfowlguild.com.

SATURDAY–SUNDAY, FEB. 17–18

Enjoy the finest in handmade fishing rods at the International Custom Rod Building Exposition held in High Point's Show-Place Convention Center. The event features 40,000 square feet of rod building supply exhibits and more than 25 seminars and demonstrations. Visit home.earthlink.net/~icrbe/ or e-mail icrbe@earthlink.net for more information.

CASP Looking for Volunteers

The long-running Breeding Bird Survey has a new sibling in citizen science monitoring of North Carolina wildlife populations. The Calling Amphibian Survey Program (CASP) was launched by the N.C. Wildlife Resources Commission last year to monitor frog and toad populations statewide.

NCWRC

CASP consists of randomly placed driving routes all across the state that volunteers agree to drive three nights out of the year. Along each route are 10 stops where volunteers listen and record on datasheets all the frogs and toads they hear during five minutes.

A worldwide decline in frogs and toads has prompted the U.S. Geological Survey to administer the North American Amphibian Monitoring Program (NAAMP), of which CASP is a member.

NAAMP developed an online database that allows state coordinators, volunteers and the general public to interact directly by learning frog calls, taking frog call quizzes, entering data and downloading route information. This program will allow biologists to monitor and detect changes in frog and toad populations over time throughout North America.

CASP volunteers receive a packet with monitoring materials and instructions, and free training workshops will be held periodically to assist volunteers in running their routes. In addition, each route volunteer will receive a free copy of "The Frogs and Toads of North Carolina," a booklet and accompanying CD being produced by the commission.

If you have always wanted to know the identity of frogs and toads you hear in your area and would like to help monitor nongame wildlife, please visit the CASP Web page at www.ncparc.org for more information and downloads. Additional information on NAAMP may be found at www.pwrc.usgs.gov/naamp/. Contact Sarah Cross Owen at sarah.cross@ncwildlife.org if you would like to participate.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

Grant Assists Birding Trail Publication

For nature lovers in North Carolina, bird watching will become a little easier after the Progress Energy Foundation awarded a $25,000 grant to the North Carolina Birding Trail. The grant, presented to the N.C. Wildlife Resources Commission late last year, will help pay for the publication of the Coastal Plain region birding trail guide.

The birding trail, a statewide effort aimed at promoting bird watching and habitat protection through nature-based tourism, education and wildlife conservation, is being implemented in three regional components, starting in the Coastal Plain. The regional birding trail guide is the first part in a series of guides that will serve as the core publication for visitors to use as they travel the state. The guide will identify good birding sites and link bird watchers and nature-based tourists with other attractions, lodging and businesses in the Coastal Plain. It also will enhance economic growth in communities along the trail by promoting a new form of tourism for the region.

A 2001 survey by the U.S. Fish and Wildlife Service of fishing, hunting and wildlife-associated recreation showed that 18 million people traveled to view birds and spent nearly $39 billion on wildlife watching nationwide.

The N.C. Birding Trail is led by a steering committee with representatives from the commission, N.C. State Parks, N.C. Sea Grant, N.C. Cooperative Extension, Audubon North Carolina and the U.S. Fish and Wildlife Service. For additional information about the initiative, visit the NCBT Web site at ncbirdingtrail.org.

IN SEASON

This month, these hunting seasons are open in North Carolina:

Bobcat: Through Feb. 28.
Common Snipe: Through Feb. 28.
Crow: Wednesday, Friday and Saturday of each week through Feb. 28.
Opossum and Raccoon: Through Feb. 28.
Pheasant: Through Feb. 1.
Quail: Through Feb. 28.
Rabbit: Through Feb. 28.
Ruffed Grouse: Through Feb. 28.

MIGRATORY WATERFOWL
Snow, Blue and Ross' Geese: Through March 3.
Youth Waterfowl Day: Feb. 3.

Check the *2006–2007 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 yeor old—Application must be received before applicont hos ottained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before opplicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (oges 1 through 11—Applicotion must be received before applicont hos ottained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (oges 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing. $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game londs)
- ☐ Comprehensive Hunting. $250
  (N.C. residents only—includes bosic hunting, big game, game londs & N.C. waterfowl)
- ☐ Sportsman. $500
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  (N.C. residents only—includes coastal recreational fishing)
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Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
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- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

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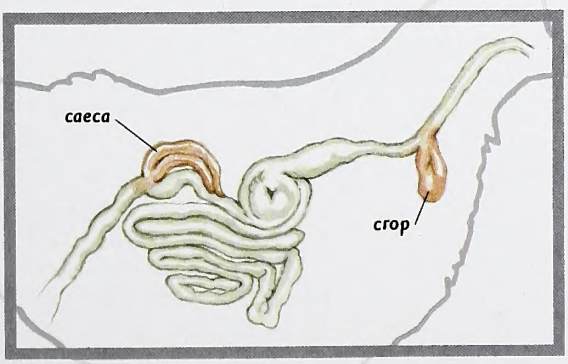
How Does A Ruffed Grouse Survive A Mountain Blizzard?

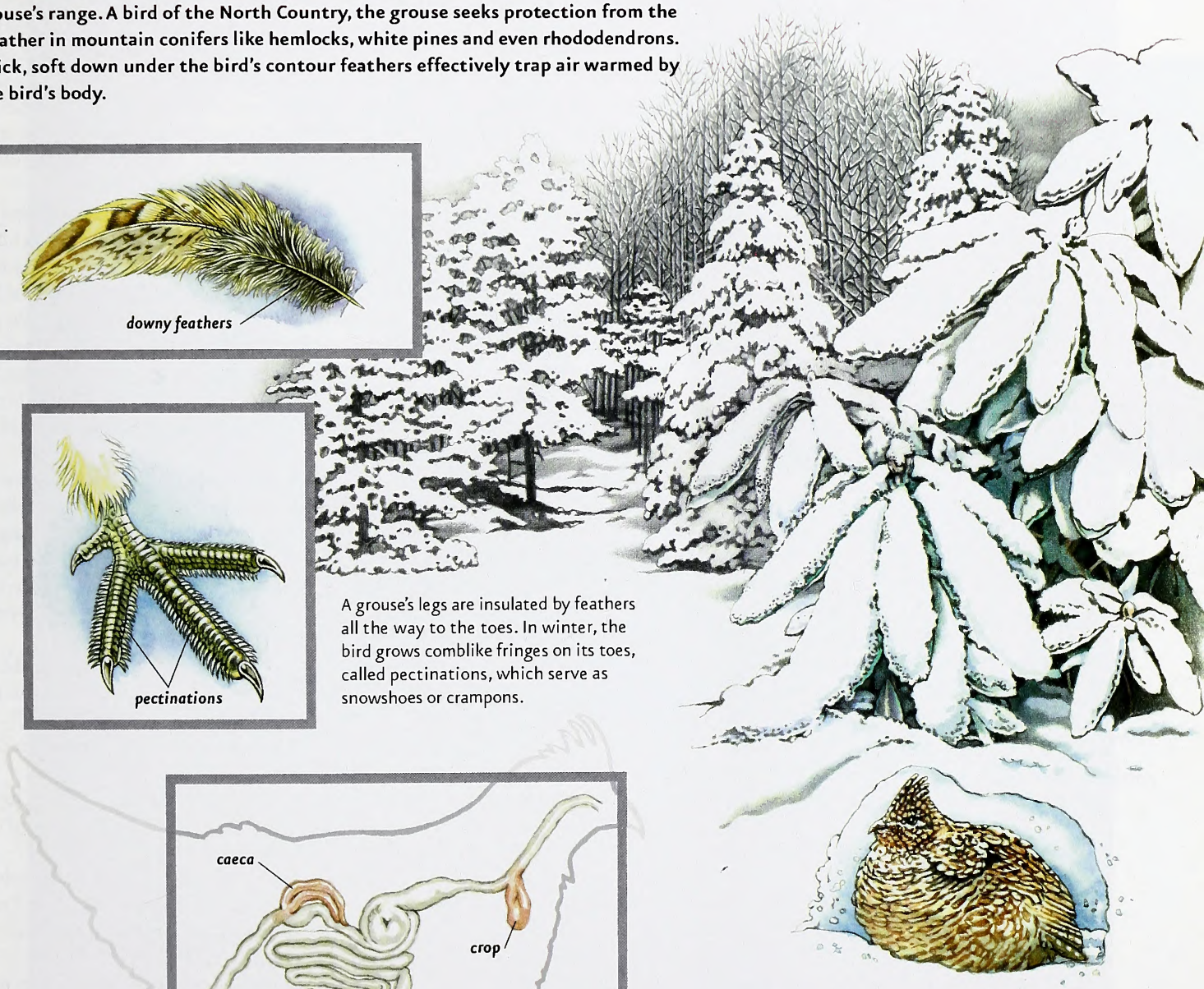
written by Clyde Sorenson
illustrated by Jim Brown

NORTH CAROLINA'S HIGHLANDS are near the southern edge of the ruffed grouse's range. A bird of the North Country, the grouse seeks protection from the weather in mountain conifers like hemlocks, white pines and even rhododendrons. Thick, soft down under the bird's contour feathers effectively trap air warmed by the bird's body.

A grouse's legs are insulated by feathers all the way to the toes. In winter, the bird grows comblike fringes on its toes, called pectinations, which serve as snowshoes or crampons.



In very cold weather, a grouse rapidly stuffs its large crop full of foods such as the dormant buds of apple trees. Outpockets in the grouse's digestive tract, called caeca, function like fermentation tanks and aid the bird in harvesting every bit of energy and protein from its food. After feeding, a grouse sits motionless for long periods, conserving energy while it digests its food.



Under bitterly cold conditions, a grouse may plunge into a snow bank to spend the night, insulated from the frigid night air in its own igloo. This behavior sometimes occurs even in the relatively balmy southern Appalachians.

In Good Company

written by Jim Dean

I am hardly ancient, but I have reached the age when I am occasionally in the company of ghosts. Today, for example, I am following the path my grandfather walked on his way to school in the 1880s. It winds across our family farm in Granville County, but if he had not often pointed it out to me when I hunted with him as a teenager, I would never suspect that this shallow depression had ever been a road. It is filled with trees far older than I am.

JIM DEAN

Ahead, a windowless house with crooked lightning rods on its roof stands behind time-shattered cedars. I can recall the names of two families that onced lived here, but they are gone and their cemetery lies abandoned nearby.

"I don't mention that the back field has 30-year-old pines in it, or that I have seldom seen rabbits or quail in recent years."

"William, you see that pond behind the house?" Grandpa says. "We built it to irrigate tobacco, but if I had it to do over again, I'd make it deeper." I have grown accustomed to being called by some family name from his past, usually William, but sometimes Jasper, John or Sam, his brothers. We cross the field behind the house and walk along the edge for 1,000 yards or so, then duck into the woods and follow a small spring branch to a second pond.

"Now, this pond is spring fed and never goes dry," he says. "The logs in that curing barn there were cut on the farm." The pond shimmers faintly in the gray light, its banks heavily overgrown, and only weedy piles of stones and rusted tin mark the site of the barn. Three deer slip into the gloom across the pond, but Grandpa seems not to notice.

"All you have to do is set out a few gums to catch all the rabbits you want," he says. "Look at all their trails here. But gentleman bobwhite is our favorite, isn't that right, William? Bet Mack finds that covey in the back field today." I don't mention that the back field has 30-year-old pines in it, or that I have seldom seen rabbits or quail in recent years. When was it that Dad and I found that last small covey of quail, 10 or 12 years ago? We didn't shoot a bird that day—seldom ever did—but they're gone anyway.

"Never been a deer or a turkey here in my memory, and very few in the Piedmont that I know of," he says. "They were long gone before I bought the first piece of this farm in 1906." I don't tell him that deer are eating up the soybeans we've been planting since we stopped growing tobacco. At least two dozen Canada geese are honking overhead somewhere behind us, and three wood ducks cross the distant tree line and drop into the new pond that Dad and my brothers and I built in 1986. If Grandpa hears the geese or sees the ducks, he doesn't say so. Beyond the next field sits my cabin.

"Been awhile since Mack checked in," Grandpa says. "Maybe he's found those birds on the hill behind this little house. One of these days we ought to fix it up—clean off all those vines and put windows back in it. Porches would be nice, too, wouldn't they?" Pretty much what I had in mind myself, I think, looking at the hammock swinging under the eaves just outside the kitchen where wood smoke curls from the chimney. I count nine turkeys in the far end of the field out front.

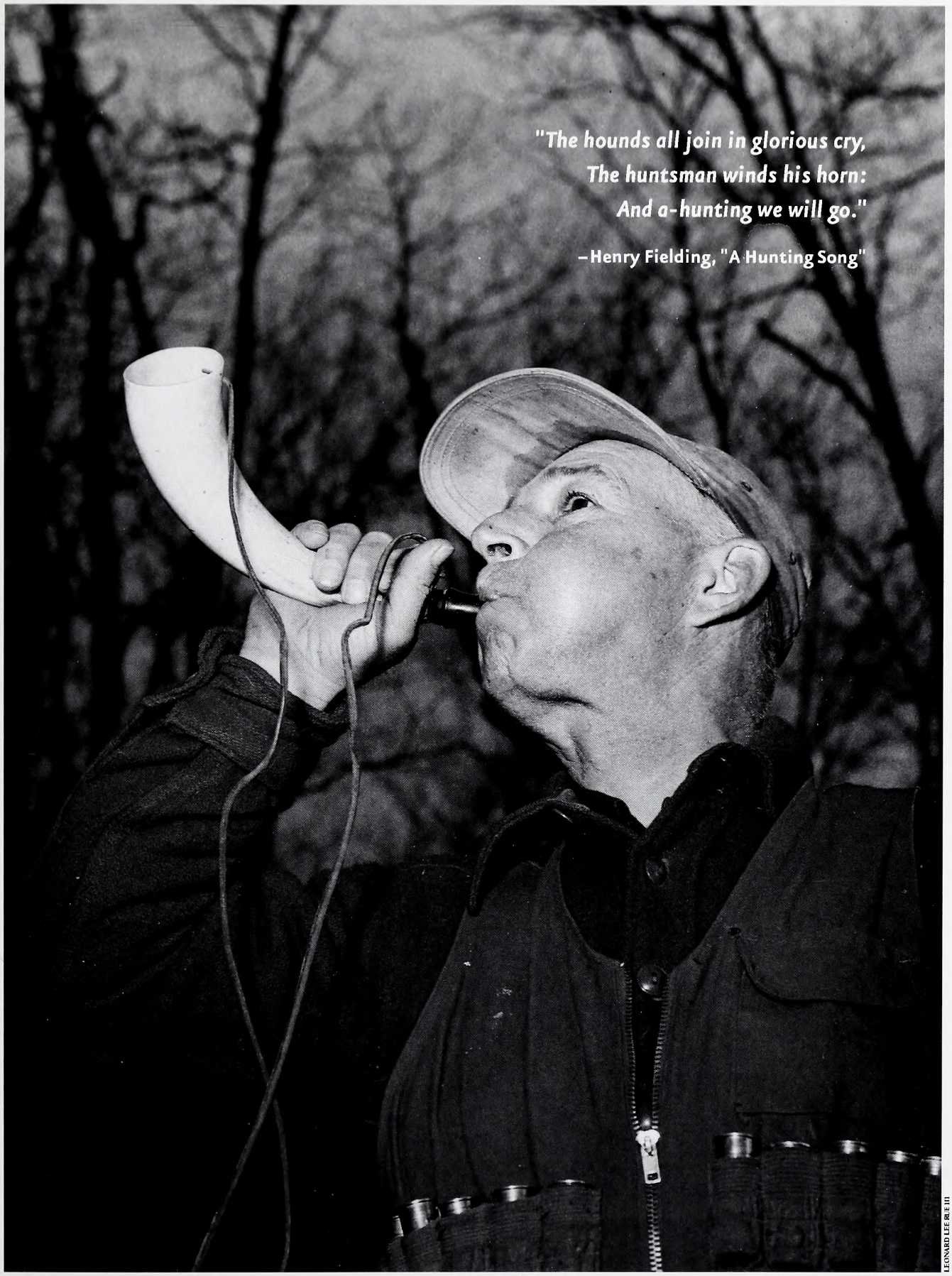
We walk on through the fading February afternoon. It will be dark in less than an hour. Mack has joined us, but he makes only a half-hearted swing into the edge of a field of corn stubble as we walk past a cluster of log barns toward the big house at the end of the path where Curtis and Louise King have lived since his parents moved here in 1950.

Grandpa unloads his shotgun and pulls up the collar of his thin leather jacket. "Getting chilly, but I believe I can smell Mrs. King's coffee and fatback biscuits. I hope Curtis and the other kids haven't eaten all of them."

In the yard, he helps Mack into the trunk of his gray, cigar-ruined '53 Chrysler, and inserts a board to keep the lid cracked for ventilation.

"You know, Jasper," he says. "Sometimes I wonder what this place will be like years after I'm gone. Probably always be tobacco and bobwhites here, but I guess you'll see some changes."

Back in my cabin, I throw a log in the fire, light an oil lamp and look at old photos taken at this century-old family farm. One is of my son, Scott, showing Dad his first quail. On the sideboard is an ashtray full of stone spear points picked up in nearby fields. Would the hunters who made them several thousand years ago recognize this land? It occurs to me that mortal limits may be a blessing that keeps any of us from ever knowing.

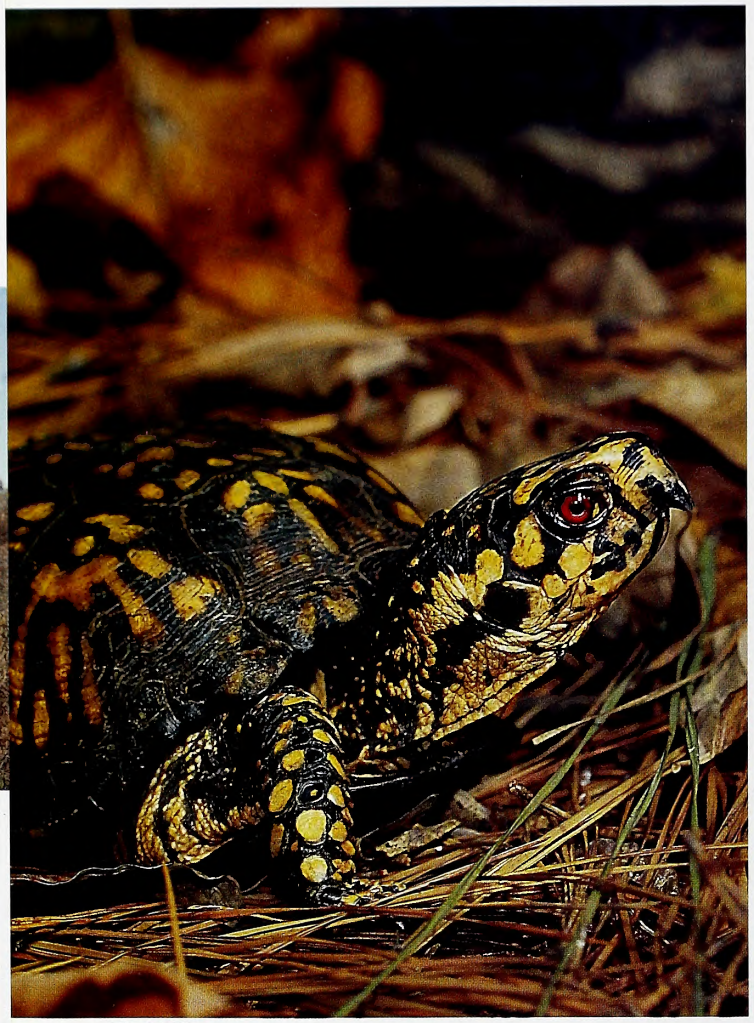


LEONARD LEE RUE III

OUTDOOR MOMENT

Calling the hounds in

IN THE MARCH ISSUE



MELISSA McGAW

WILDLIFE ACTION PLAN

Our state has a new plan to protect creatures both rare and common. The first part of a series explains how it works.

CHINQUAPINS

This cousin of the chestnut, used extensively by American Indians and colonists, has survived despite the fall of its relative.

YELP, PUTT, GOBBLE

These four North Carolinians have turned several types of functional, effective turkey calls into works of wildlife art.

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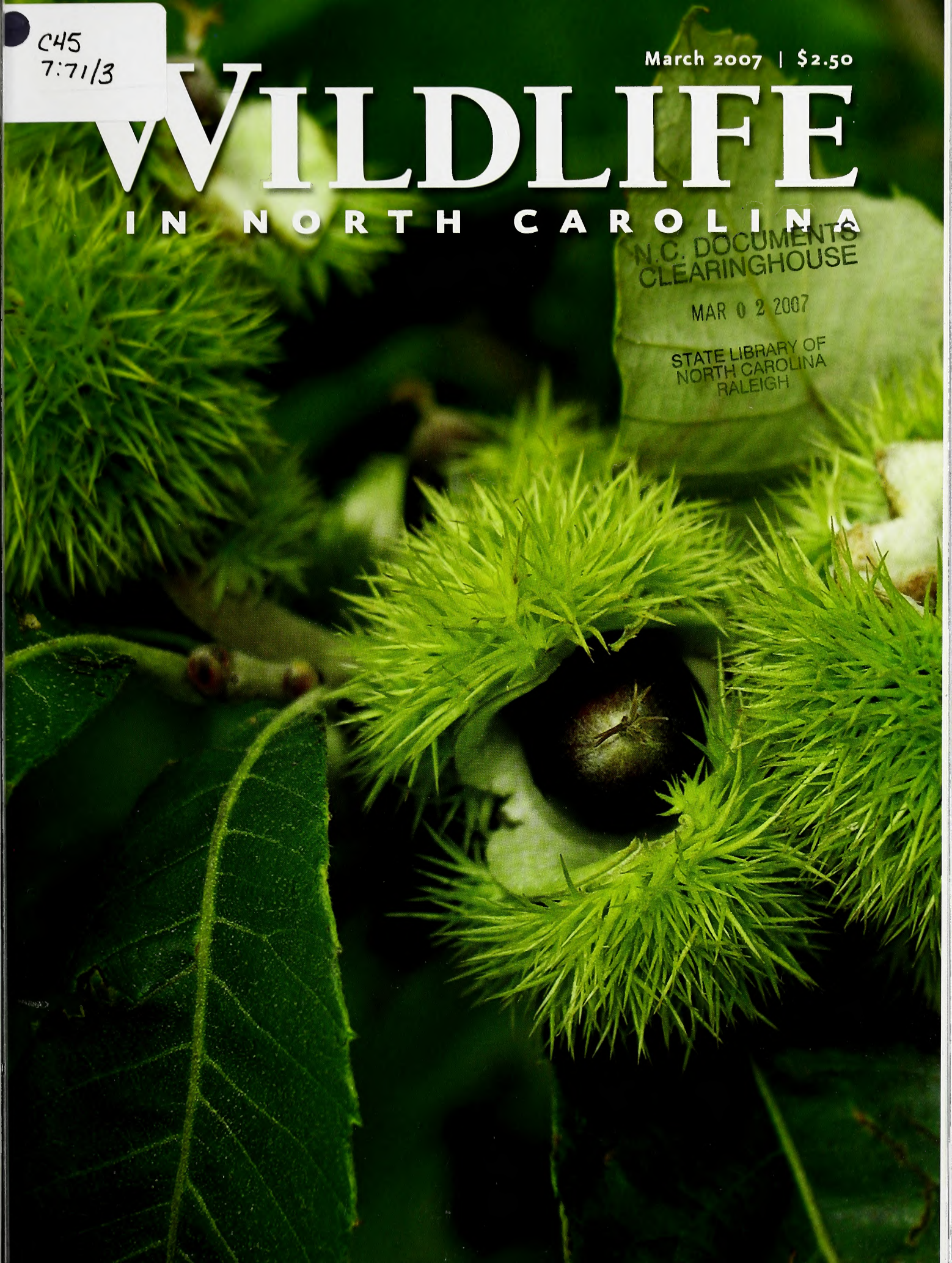

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RALEIGH

Ed Wynn uses these tools to create beautiful box and wing-bone calls for turkey hunters. He and other craftsmen are finding that collectors love their work, too.
PHOTOGRAPH BY PETER HUTSON.

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Cover: The uncommon chinquapin hides its delectable chestnut-like fruit inside a spiny hull that eventually dries, turns brown and falls off to reveal a thin-shelled nut. PHOTOGRAPH BY CHRIS EVANS, UNIVERSITY OF GEORGIA.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

I love power tools. There's nothing like ripping through a board with a table saw or driving screws with a cordless drill. In reality, there are few tasks power tools enable me to do that I couldn't perform with my old hand tools. Power tools just help me to do the job quicker, more efficiently and neater than manual tools might permit.

The N.C. Wildlife Resources Commission's new Wildlife Action Plan is a power tool for conservation ("Many Creatures, One Plan," page 4). Like a three-in-one drill/sander/jigsaw combo, it can tackle many different jobs. It details Wildlife Commission projects and partnerships statewide, provides a mechanism for North Carolina to receive federal funding, and educates the state's citizens about how they can help conserve crucial wildlife habitat. If commission biologists are working on a project, the plan is helping them get it done.

MELISSA McGAW

Little blue heron

In issues later this year, we will discuss how the Wildlife Action Plan is being implemented in the three regions of the state—Mountains, Piedmont and Coastal Plain—and through statewide projects and partnerships. Why five stories discussing the plan? Because this is the first time all of the Wildlife Commission's initiatives have been collected in one document, and it is an excellent opportunity to educate the public on how they can help the agency preserve precious natural resources.

It's surprisingly easy to contribute time or money to the cause: buy a Wildlife license plate at ncdot.org/dmv, donate on your North Carolina income tax form, write or call your state or federal senator or representative to voice your thoughts on funding for wildlife conservation, or visit teaming.com to see how you can get your hands dirty in conservation at the grassroots level. And even if you choose not to actively participate, knowing what efforts are taking place across the state will help you make informed decisions in situations that could affect wildlife.

So please read our story in this issue and those in the coming months, and decide if you want to grab ahold of the power tool that is the Wildlife Action Plan.

Greg Jenkins

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MARCH 2007 VOLUME 71, NUMBER 3

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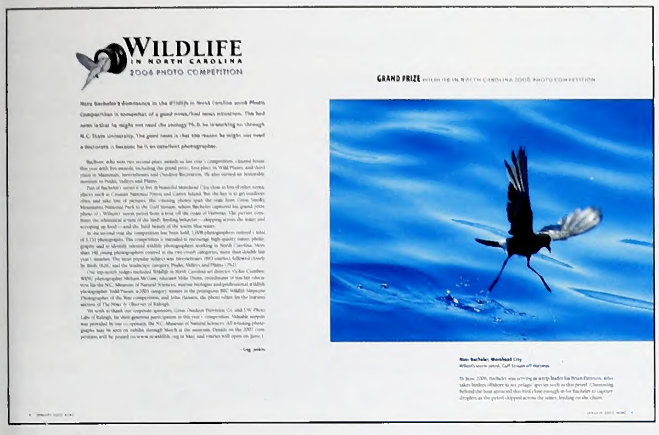

Fantastic Photos

You can imagine my frustration when I realized that the annual photo contest issue (Jan. 2007) was on my table and I didn't get a letter telling me that you would be using one of my submissions. However, as I looked over the photographs, my disappointment turned to wonder as page after page of wonderful imagery filled the pages. I even took it upon myself to contact local winner Kirk Pullen (Birds, first place) to congratulate him on his winning submission. I promise to work even harder this year at capturing an image that will do your wonderful magazine justice! I think that I may have even made a friend due to not winning as I have invited Mr. Pullen to join an online community which discusses photography in our area. Thanks for everything you guys do for us.

My subscription to *Wildlife in North Carolina* is probably the best birthday present anyone has ever gotten me. Thanks, Amy!

James Costin
Kenansville

I enjoyed the 2006 Photo Competition in the January issue. The rich images are reminders of our diverse wildlife and what a great state we live in. I put each issue in our waiting room and it seems to be the most popular magazine we have for our clients. As a native North Carolinian I brag to many of our new Northern transplants that we have much to offer in outdoor recreation, so they should get out and enjoy it year-round. Issues such as January's help hammer that message home!

Billy Cuthrell
Wendell

The photography competition issue was splendid. If I were to make a suggestion, it would be an inclusion of a statement of technique by the photographer, including the photo essentials. It seems to me there is a great nature lesson beneath the beauty of these photographs and such a description would add immeasurably to their depth. Please consider this suggestion.

Jerry Partrick
Wilmington

Thanks for the suggestion, Jerry. We have considered doing that in the issues covering the photo competition each of the past two years. However, in many cases, we found it difficult to gather the necessary information. We will make a renewed effort to collect the technical specs for each of our winning photos in the 2007 competition. For those interested in participating in this year's Wildlife in North Carolina Photo Competition, entry will open on June 1 on our Web site, www.ncwildlife.org.

Just Ducky

"Greenhorn Duck Hunting" (Dec. 2006), written by Jonathan Hewitt, was such a great read. I, in a blind with my parents from age 5, shared many of the same experiences the past 63 years. We must preserve the hunting tradition for our grandchildren.

Gerry Fitzgerald
Pinehurst

A Soft Spot for Snakes and Such

I love *WINC* and look forward to every issue. Every time I read one of your articles on reptiles or amphibians, it takes me back to my childhood. As far back as I can remember, I've been intrigued by reptiles and amphibians. Growing up in eastern North Carolina, there were an abundance of them. Of all the snakes and frogs I caught as a child, I was never bitten. Many times as a child, I would come home after hours of playing and Mom would see frog legs and lizard tails sticking out of my pants pockets.

Once, when I was about 6 or 7, it was springtime and there were hundreds of tiny, baby toads in the ditches where I loved to play. My friend, Theresa, and I decided we would build a baby frog hospital (we thought toads were frogs). We constructed a multilevel hospital out of empty matchboxes and placed soft cotton balls, for beds, into each compartment. Then we caught a couple or three dozen baby toads and placed one in each comfy bed in their hospital rooms. We really felt good about what we were doing. The next day, however, when we went to check on our patients, we were horrified to find that all of our little baby frogs were completely dead and dried up! The cotton had sucked all the moisture out of their fragile little bodies. We were truly remorseful.

To this day I love reptiles and amphibians. I hope one day it will be against the law to own them as pets — it's just not natural.

Diana Bottone
New Bern

The 'Other' Magazine

Nice job with your recent biennial report. I think the layout and photography are outstanding and complement the text of the report very well. The running timeline in the margins is nice, too. Just a quick browse through the report shows you've accomplished a great deal in the past two years and throughout your agency's history.

As the editor of the Pennsylvania Game Commission's *Pennsylvania Game News* magazine, I've been responsible for producing more of these sorts of reports than I care to admit, and I can appreciate all the work and talent that it takes to present such technical and bureaucratic information in a form the public will find appealing and interesting. Again, nice job.

Bob Mitchell
Harrisburg, Pa.

write us

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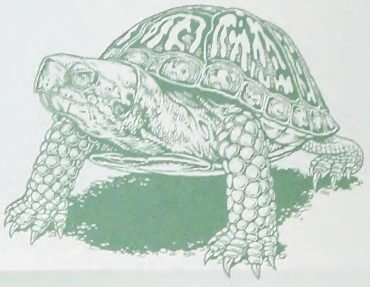
Many Creatures, One Plan

Wildlife Action Plan KEEP COMMON ANIMALS COMMON



The N.C. Wildlife Resources Commission has created a Wildlife Action Plan that addresses many of the state's conservation needs for the next decade.

This is the first of a five-part series about North Carolina's Wildlife Action Plan. Each successive story will discuss how the plan is being implemented in a different region, culminating with a final piece about statewide initiatives.

MARCH	INTRODUCTION TO THE PLAN
MAY	MOUNTAIN REGION
JULY	PIEDMONT REGION
SEPTEMBER	COASTAL PLAIN REGION
NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

Perhaps your first encounter with an Eastern box turtle was in your own back yard as a child. Maybe it was on a walk in the woods. You might have bumped into a box turtle in a moist, low-lying area along the trail. If you are a gardener and can't resist growing cantaloupes, it's possible you've been frustrated by box turtles raiding your melon patch. Of course, all of us have seen box turtles on the highway, often in harm's way as they wander about, lovesick, looking for mates. Everyone has seen one of these creatures, often in the most mundane of places.

In contrast, many of us have watched televised wildlife programs portray endangered species' desperate struggles for continued existence. Perhaps you've seen a documentary on the red wolves that were introduced into the Alligator River National Wildlife Refuge in eastern North Carolina. Those who have been around for a few years may recall following the story of the tiny snail darter in eastern Tennessee. It was big news when the little fish delayed the completion of the Tennessee Valley Authority's Tellico Dam.

These two animals, despite being very rare and found in isolated places, are familiar to us because they became focal points for the federal Endangered Species Act. Unlike the box turtle, few of us have ever seen one of these endangered species in the wild. They represent an approach to conservation designed to bring wildlife back from the brink of extinction. A few years ago, the federal government took an action that gave the box turtle something in common with red wolves, snail darters and other threatened and endangered species.

If you were thinking this slow, deliberate creature had somehow made it onto the federal endangered species list, you would, of course, be mistaken. However, the box turtle and many other more common animals are now the objects of their own federal conservation effort. The State Wildlife Grants Program is designed to keep animals like the box turtle from ever needing Endangered

written by CAROL PRICE *and* SCOTT VAN HORN

Species Act protection. Each state participating in the State Wildlife Grants Program was required to develop a statewide conservation plan. The result of that requirement in this state is the North Carolina Wildlife Action Plan, a comprehensive management tool developed by the N.C. Wildlife Resources Commission with assistance from many partners. Its aim is to help conserve and enhance the state's biodiversity and most important habitats. A key part of its mission is to make sure that common animals like the box turtle stay common.

ACTING ON A CONGRESSIONAL MANDATE

Recognizing that much of our nation's wildlife is at risk of population decline, the U.S. Congress set up the State Wildlife Grants Program in 2001. Each Wildlife Action Plan submitted was to evaluate the status of the respective state's wildlife species and the habitats in which they live, identifying threats to each species and its associated habitats. Congress required that gaps in knowledge of species status, habitats and threats be identified in the plans.

Each state was required to develop a list of conservation actions that could be used to restore, improve and monitor the status of priority animals and their habitats. The monitoring component allows agencies to evaluate the performance of conservation initiatives. finally, Congress wanted broad public participation during the development of these conservation plans and in carrying out each plan.

From 2001 to 2005, the Wildlife Commission partnered with more than 50 state and federal agencies, nonprofit conservation groups, universities, private companies and individuals to develop the N.C. Wildlife Action Plan. The plan builds on a long, productive history of conservation efforts by many individuals and organizations in this state and is strengthened by concurrent conservation strategies being implemented by each of the other 49 states. The plan provides a cost-effective, proactive approach to the conservation of entire wildlife communities, including those fish and wildlife species for which management was traditionally underfunded. It is an ambitious plan whose success will be measured by the cultivation of lasting conservation partnerships and by the promise of fish and wildlife resources for future North Carolinians.

North Carolina proved to be a leader in the national effort to develop the plans, becoming

HABITAT IS WHERE IT'S AT The Wildlife Action Plan strives to protect dozens of species, including the examples on this map, by placing emphasis on habitat conservation. By protecting the areas in which animals live, the N.C. Wildlife Resources Commission hopes to increase populations of rare and endangered animals and keep numbers of common animals strong.

MAP AND ILLUSTRATIONS BY BILL TIPTON

the first state to submit a completed Wildlife Action Plan in the fall of 2005. The plan was ranked in the top 12 nationally by a panel sponsored by a national conservation organization. With continued support and cooperation from the broader conservation community and a commitment from its citizenry, the Wildlife Commission hopes North Carolina will maintain its leadership role as the Wildlife Action Plan is implemented.

The team assembling North Carolina's Wildlife Action Plan had several key principles in mind. Because conservationists have long known that the way to conserve species most efficiently is to conserve habitats, the team wanted the plan to encourage thinking and acting on the habitat scale, affecting multiple species simultaneously. They also recognized that to be effective, conservation must be everybody's job—the more people that know about wildlife conservation, the more likely they are to care. Consequently, the plan emphasizes support for conservation education efforts aimed at fostering that understanding among the state's citizens. Finally, the plan advocates sustaining and improving existing regulations and programs that conserve habitats and their associated plant and animal communities.

SERVING THE GREATEST NEED—AT HOME

The State Wildlife Grants Program mandated that the focus of the Wildlife Action Plan be the state's priority species of highest conservation need. The commission worked with expert biologists statewide to identify 371 priority species. These are the birds, mammals, reptiles, amphibians, fish, mollusks and crustaceans that are currently targeted for conservation action. The plan does not directly address marine species, but references the Coastal Habitat Protection Plan developed by the N.C. Division of Environment and Natural Resources. The Wildlife Action Plan identifies the federally listed threatened and endangered wildlife in North Carolina, but because the focus of the State Wildlife Grants program is more common species such as whip-poor-wills, alligators, hognose snakes and American oystercatchers, these types of animals comprise the majority of the plan's priority species.

There are more than 58 species of freshwater mussels in North Carolina, and 43 are on the priority list. Better stewardship of our state's waterways is the primary remedy for conservation of all these species. The Wildlife Action Plan describes all 17 river basins and 23 types of habitats that can be found across the state. The plan matches each priority species to the habitat type or river basin where it is found, identifies the most important challenges facing each habitat, and details the critical actions required to protect and conserve these habitats. This is the basic framework underlying the Wildlife Action Plan. Priority wildlife can now be specifically targeted by carefully considering conservation or management options within essential habitats.

Much of the conservation vision of the Wildlife Action Plan was integrated into the

THE PLAN: A NOT-SO-EXTREME MAKEOVER

Since its humble beginnings in the 1940s, the N.C. Wildlife Resources Commission has practiced habitat conservation in ways that benefited box turtles, songbirds, nongame mammals, freshwater mussels and other animals found in the Wildlife Action Plan's list of priority conservation species. The commission created a nongame program in the mid-1980s to focus directly on many of these priority conservation species.

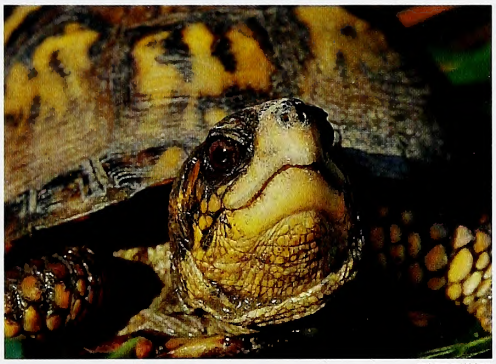
The plan was put together with the input of many other individuals and groups with a long history of doing conservation in North Carolina. Not surprisingly, much of the work that has been done and is ongoing is identified in the plan. It is the hope of the Wildlife Commission that the plan will better prioritize its future efforts, better coordinate its conservation programs and better leverage the work done by the commission and the broader conservation community. In every sense, the plan represents an important refinement of an existing program.

To read the plan, visit www.ncwildlife.org and click on "N.C. Wildlife Action Plan" under the Features header on the front page.

The plan aims to protect animals such as rare Eastern diamondbacks, common Eastern box turtles and relatively common loggerhead shrikes, as well as habitats such as mysterious Carolina bays.

The State Wildlife Grants Program mandated that the focus of the *Wildlife Action Plan* be the state's *priority species of highest conservation need.* The commission worked with expert biologists statewide to identify *371 priority species.*

MELISSA McGAW



TODD PUSSER

MELISSA McGAW

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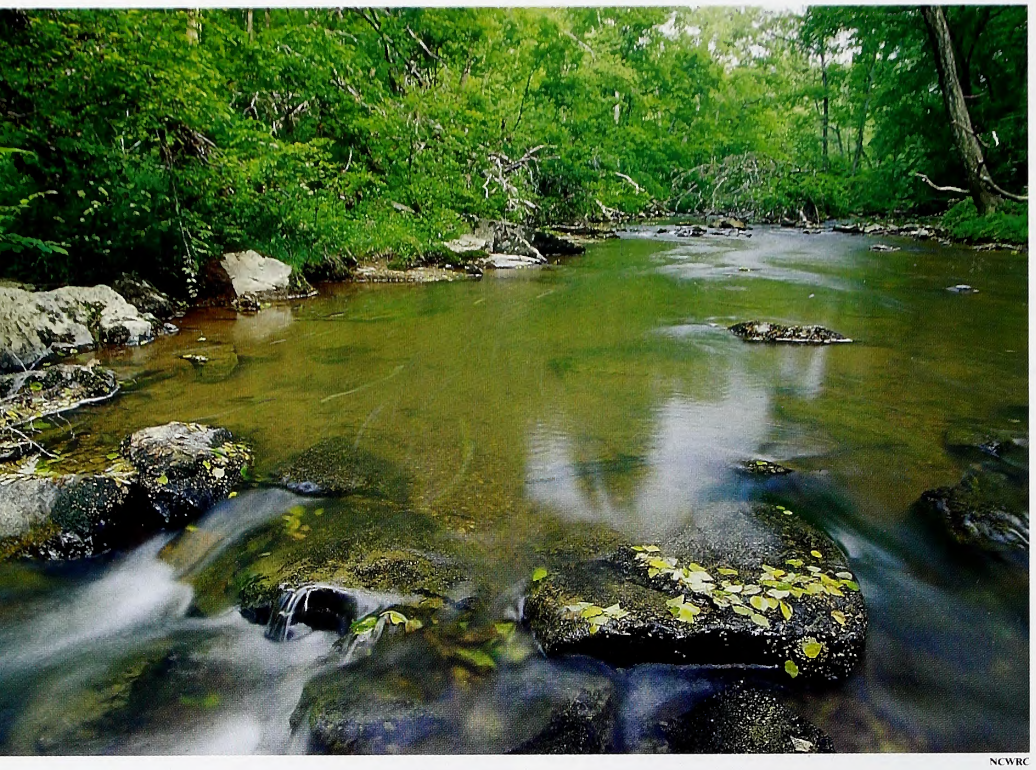


NCWRC

Piedmont streams will benefit from conservation efforts detailed in the plan, as will the Brimley's chorus frog and the marsh rabbit.

TODD PUSSER

MELISSA McGAW

habitat/river basin framework, but there were exceptions. North Carolina is being developed at a rapid rate. A section on urban wildlife management was included to emphasize that with a little proactive cooperation and planning, urban areas can be wildlife friendly. Since most of the state's wildlife resources are not found on public lands, a section pertaining to private-lands management was included to provide guidance for landowners wishing to engage in conservation on their property.

Land acquisition by direct purchase is another important conservation tool. The plan includes a section on land conservation strategies to review the uses of land acquisition, identify the players in North Carolina and discuss opportunity areas and planning. This section provides two excellent case histories

TEAMING WITH WILDLIFE

Teaming With Wildlife is a coalition of more than 4,500 organizations working to prevent wildlife from becoming endangered by supporting increased state and federal funding for wildlife conservation. This coalition includes wildlife managers, conservationists, hunters and anglers, businesses and many others who support the goal of restoring and conserving our nation's wildlife.

Historically, state fish and wildlife agencies have been on the front lines of conservation as stewards of wildlife. Effective state and local conservation work requires creative problem solving, including public and private partnerships, community will, ample funding, research, and dogged determination to work out practical management strategies. Teaming With Wildlife is committed to helping this happen.

With the leadership of state fish and wildlife agencies, wildlife action plans will bring together a diverse group of conservation partners including conservation organizations, hunter and angler groups, and state and federal agencies. The Teaming With Wildlife coalition supports these efforts, which will ultimately benefit both wildlife and people.

To find out how you can get involved with Teaming With Wildlife or supporting North Carolina's wildlife conservation efforts, visit www.teaming.com and click on "State Wildlife Action Plans."

from the Sandhills and the Onslow Bight. A final section on education, outreach and recreational strategies addresses the plan's aggressive education priorities and goals.

Together, the habitat/rivers sections and these four statewide conservation strategies provide the Wildlife Commission with a tangible conservation vision that can be shared with other agencies and citizen groups that are also committed to conservation of wildlife resources. The Wildlife Action Plan can serve as a consistent, statewide blueprint for building long-term partnerships to carry out conservation actions in North Carolina.

THE PLAN AND NORTH CAROLINA'S FUTURE

North Carolina is home to a rich diversity of wildlife. As more people move to the state, we must be prepared to meet the challenges of balancing human and wildlife needs. The biggest threats to wildlife are the loss and degradation of their habitat. Animals need safe places to live, gather food and raise their young. Through the proactive strategies in the Wildlife Action Plan, we can keep animals from becoming endangered or extinct. While conservation efforts directly benefit wildlife, protecting land for animals doesn't just help creatures—it is good for people, too.

Clean air and water for wildlife also means a healthier place for us to live. Pollutants pose a threat to all living things. Our drinking water comes from rivers and underground wells. A clean environment gives humans and animals safe and beautiful places to live, play and grow. Natural landscapes where animals live can also provide important protection for people. Marshes, barrier islands and vegetation along stream banks can lessen the damaging impacts of hurricanes and floods. Wetlands are natural filters for drinking water that we pump from underground.

Protecting animals and their homes now will ensure that we leave a rich natural heritage to enchant and inspire generations to come. The shared memories of family camping trips, hikes to waterfalls and discovering box turtles in the backyard are a legacy we owe our children. ◆

Carol Price is the Wildlife Action Plan coordinator for the N.C. Wildlife Resources Commission. Scott Van Horn is research and survey supervisor for the commission's Habitat Conservation Program.

STATE WILDLIFE GRANTS: MATCH OR MISS OUT

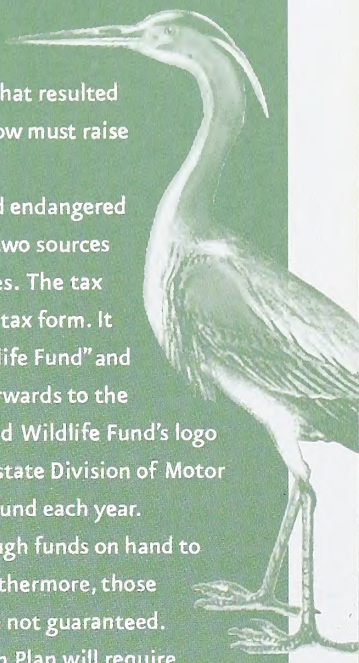
The State Wildlife Grants Program that required the development of the Wildlife Action Plan in order to receive funds also has another very important catch to it: money. The federal grants available through the program are matching grants—that is, state agencies must raise an equal amount of money to the amount requested in order to receive the grant for a given year.

In the past, the grant has been a three-to-one match—if North Carolina comes up with $100, the feds will chip in $300. That match ratio changes in 2007 to one-to-one: For every $100 a state raises, the State Wildlife Grants Program will add $100. So the $100 that resulted in a $400 budget last year now only amounts to $200. States now must raise twice as much money to keep their budget the same.

The Wildlife Diversity Program, which handles nongame and endangered animals for the N.C. Wildlife Resources Commission, has only two sources to raise matching funds: a tax check-off and license plate sales. The tax check-off is located at block 26 of your North Carolina income tax form. It reads "Contribution to the N.C. Nongame and Endangered Wildlife Fund" and is a straight donation that the N.C. Department of Revenue forwards to the Wildlife Commission. The license plate features the Endangered Wildlife Fund's logo of a cardinal on a dogwood flower and is available through the state Division of Motor Vehicles. Each plate purchase results in a $10 donation to the fund each year.

Currently, the Wildlife Diversity Program does not have enough funds on hand to match the federal dollars available at the new match ratio. Furthermore, those federal dollars are subject to federal budget constraints and are not guaranteed. Finally, full implementation of North Carolina's Wildlife Action Plan will require much more funding than is currently available through the State Wildlife Grants Program, so Teaming With Wildlife continues to work toward long-term wildlife funding. It is critical for conservation-minded citizens to continue to donate through the tax check-off.

"We absolutely cannot afford for people to get the perception that now that we have State Wildlife Grants that we're financially set," said Chris McGrath, statewide coordinator of the Wildlife Diversity Program. "The check-off dollars are declining. That perception could lead to further declines which could mean that we aren't able to match all of the federal dollars available, but more importantly, we are not able to implement the priority actions identified in our Wildlife Action Plan."



While *conservation* efforts directly *benefit wildlife*, protecting land for animals doesn't just benefit the creatures—*it is good for people, too.*

MELISSA McGAW

WALKING THE LINE

WRITTEN AND PHOTOGRAPHED BY DAVID HART

From bomb squad to trapping, Jimmy Pierce relishes the challenge of solving a puzzle.

Somewhere on the outskirts of Raleigh, Jimmy Pierce pulls his truck onto a worn trail off a paved two-lane road, unlocks a cable and eases his truck down to the edge of a pond. It's late January and Pierce, a retired Raleigh police officer, is running his trap line. The willow trees along the edge of the pond have been gnawed to pointed stumps. The remains of the willows are piled in a heap over a beaver lodge in a corner of the dam. The landowner, explains Pierce, wants the beavers gone.

"He's got too much of a good thing. Beavers certainly serve a purpose, but when you see all your trees around your pond cut down, you can understand why he has had enough," he says.

As we walk across the dam to his first set, Pierce, toting a bucket full of traps, tools and bottles of various scent lures, talks about his improbable introduction to trapping. Unlike most people, he got into trapping at a late age. He was a dedicated bass angler, competing in tournaments throughout North Carolina and neighboring states, but the luster of competitive fishing was fading.

"I was burned out on the traveling and the pressure of fishing tournaments, and I just wanted a change. About six yeas ago, I read a notice in an issue of *Wildlife in North Carolina* about a course on trapping, so I figured I'd give it a try," he recalls. "I really love the outdoors, and I knew trappers are the most knowledgeable of all outdoorsmen, so I wanted to learn how to read animal sign and outwit them."

Pierce was in Memphis the day before the course, participating in a bass fishing tournament that wasn't going so well.

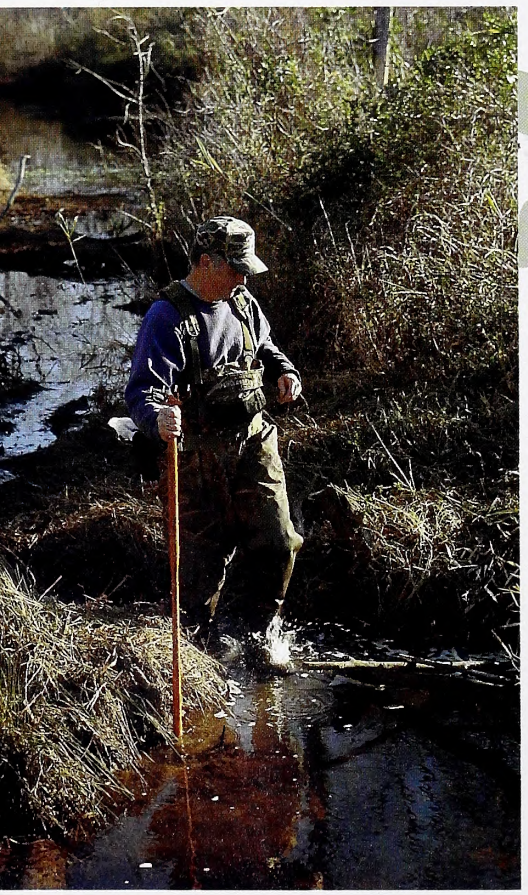
"I didn't make the cut for the next day, so I drove straight through the night and got to the place where the trapping course was held an hour before it started that morning," he says. "I was really intrigued with all that I saw that day, and I knew I wanted to give it a try."

A new passion was born and Pierce, 60, has jumped feet-first into the role of a trapper. He has since been elected president of the N.C. Trappers Association, a 350-member group of like-minded men and women who share a similar devotion to the outdoors.

Roller-coaster market

Trapping has seen highs and lows as demand for fur has fluctuated with the whims of the fashion industry. At one time, millions of pelts were shipped to New York annually and turned into coats and other articles of clothing, which were sold mostly to American and European consumers. A beaver in Pierce's trap might have brought as much as $50 back then. Now, much of the fur taken in the United States is

Increases in beaver populations across North Carolina have led to more opportunities for trappers to extend their seasons by removing nuisance animals.



shipped to Russia, China and other Asian countries as the demand in wealthier countries has declined. The beaver Pierce removed from his trap on this mild January day might fetch a $10 bill. "I don't do it for the money," insists Pierce.

Perry Sumner, research and surveys coordinator for the N.C. Wildlife Resources Commission, says the biggest change in the trapping industry took place around 1990 when fur prices, along with the number of trappers, bottomed out. During the peak of the fur market in the 1970s, about 6,000 licensed trappers pursued beavers, mink, raccoons and other furbearers throughout the state. Now, about one-quarter of that number remains.

Fur prices have also fallen by about the same amount. Today, a prime raccoon might bring $10, a good red fox around $15 and a high-quality bobcat pelt might be worth $30. Those that remain in the sport do it because it's in their blood. "It's almost like I have to do it. I can't imagine not trapping in the winter," says Pierce.

The decline in trappers, along with the steady influx of new residents to North Carolina, has led to a tremendous increase in nuisance complaints like the one Pierce is dealing with. Sumner, who served as the state furbearer biologist for 17 years, says the role of trapping has made an about-face in the years he's been keeping tabs on North Carolina's furbearers.

"The biggest challenge has gone from regulating harvest when trapping was popular to managing the animals themselves," he says. "Back then, it was really a matter of making sure we didn't take too many animals during a season so we could maintain a healthy population for everyone to enjoy. Now, we are trying to manage the animals, because with a lower rate of harvest, populations are growing rapidly and we can't control them. How do you get people to trap something they don't want to trap? The problem now has much more to do with too many animals than too many trappers."

Pierce resets the springs on his trap, a pair of heavy wire squares with foot-long springs on either side. It's a body-gripping trap that kills swiftly and humanely. He eases into the icy water and places it between two wrist-thick limbs that help support the trap.

Trapping scents

"Smell this," he says, thrusting a small bottle toward me as he leans into the pond bank. It's half-filled with what appears to be a pasty gray mud, and I hesitate to take a whiff. The tools of a trapper include some pretty potent odors, everything from rotting meat to the urine and scat of various animals. I wave my hand across the jar just like I was taught in seventh grade science class to avoid a direct whiff of any foreign substance. This time, however, my nose is treated to a pleasant, syrupy sweet smell not unlike anise. It's beaver castor, scent from a gland the animals use to mark their territory. As Pierce resets his trap, he explains that if a beaver smells the scent of an outsider, it will investigate and possibly leave some scent of its own on top of the intruder's odor. To do so, it will have to walk through the trap.

He grabs a small stick, dips it into the jar and swirls it around a few times and then places it on a mound of wet leaves and mud, a scent post known as a castor mound, pushed up onto the dam by one of the beavers living in the pond.

We walk down the face of the dam to check another beaver trap. This one is placed in a narrow, worn trail about a foot wide. Beavers, he explains, will move down to the creek to feed, and a trap set in a beaver run is a sure bet. Sometimes. This one is empty. Just as there are no guarantees in hunting or fishing, trapping carries the constant air of uncertainty. Throughout the day, we drive from one farm to another checking beaver, raccoon, otter and bobcat sets. All but a few are empty. Pierce rebaits the traps and offers some encouragement about what tomorrow might bring.

The anticipation is exactly what keeps guys like Pierce coming back to their trap line day in and day out. Many, including Pierce, say trapping is similar to Christmas: Every day brings the possibility of a pleasant surprise. Much like a child looks forward to seeing what lies under the tree Christmas morning, a trapper can't wait to get to his sets the next day. Will it be a skunk, the equivalent of a lump of coal in a stocking, or an otter or bobcat, perhaps the two most difficult animals to fool and the biggest prizes in trapping?

Whether he catches a skunk or a prime, white-bellied bobcat, Pierce certainly doesn't do it for the money. He says a serious trapper, back in the 1970s when fur prices were at their peak, could make a decent living, or at least enough to justify the expense. Now, however, those trappers who are still setting

steel are doing it because they love the challenge and the "office" in which a trapper works. Last year, otters were bringing top dollar, the highest Pierce has ever seen them. A decent otter pelt brought about $100, a price that was bound to fall. It did, but Pierce is certainly hooked, no matter how much money he makes. Or loses.

As we drive to the next farm, he explains the lure of a truck filled with muddy waders, leaking bottles of scent that range from sweet to foul and the long hours of wet hands and numb fingers. Pierce worked on the Raleigh Police Department's bomb squad, and he was captivated by the challenge of solving the puzzle of a crime scene. Trapping, he says, keeps him outdoors and it also keeps him in shape. He'll walk as many as 2 miles a day checking traps.

"It keeps me young," he says. "I get plenty of exercise, and it's exciting just coming out here every day."

Most of all, trapping requires piecing together a puzzle, one that involves deciphering tracks and other sign and then figuring out the right spot to set a trap, the right lure and the best way to way to place the trap so the animal steps in it.

"My mentor, Claudie Taylor, once told me that an animal has the whole world to walk in, but you've got to make him step in a spot the size of a silver dollar if you want to catch him," he recalls. "It's that challenge that I really love."

Shrinking landscape

The world in which that animal can walk, however, is rapidly shrinking. In just the few short years that Pierce has been involved in it, Wake County, where he does most of his trapping, has evolved from a relaxed mix of urban and rural into one of rampant development. As we drive from one farm to another, Pierce points to new housing developments that used to be farmland where he once set traps. One farm will eventually be a 4,000-home community. It once was filled with wildlife. In only one spot, the banks of a small river deep in the woods, are we out of sight of a house or the sound of tires whining on pavement. Not only are lower fur prices driving some from trapping, but also many have quit because they simply don't have a place to go anymore.

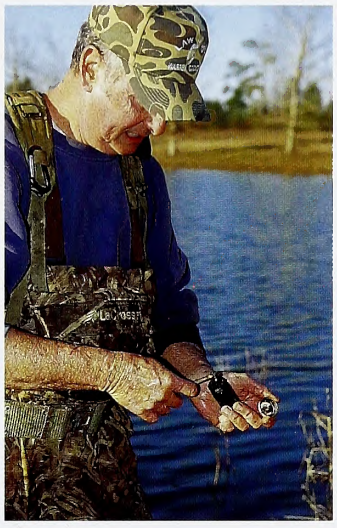
Ironically, North Carolina's population boom is also creating more opportunities for those trappers that remain. "I'd guess that the number of complaints about nuisance animals like woodchucks, beavers and other wildlife has tripled in the last 10 years," says Sumner.

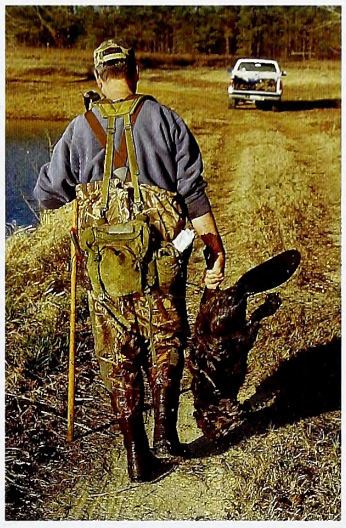
The commission itself does not handle most nuisance animal complaints, but instead refers people to a listing of damage control agents such as Pierce. Sumner says the number of trappers licensed by the commission to deal with complaints has risen to about 360 people. The program was first started in 1995 after biologists and game wardens were simply overwhelmed by the increasing number of complaints about tree-felling beavers, garden-thieving groundhogs and attic-bound squirrels. Those calls are now routed directly to local damage control specialists, who are certified by the commission to issue harvest permits for nuisance animals. The commission also has a page on its Web site (www.ncwildlife.org) that lists animal control agents and the counties in which they live and work.

"A lot of the jobs they do are such things as removing squirrels or birds from attics, but there are countless calls about beavers cutting down ornamental trees and flooding backyards and basements with their dams. We would never be able to handle all the calls," says Sumner.

By working as an animal damage control agent, Pierce has turned the conflicts between humans and wildlife into a decent way to make a few extra dollars in his retirement. Instead of ending his season with the established dates, he'll put in several more months responding to calls from homeowners who want nuisance wildlife removed. He could probably work throughout the year nonstop, but even a dedicated trapper needs a break now and then. ◆

David Hart is a freelance outdoors writer living in Virginia. He is a regular contributor to WINC.





Checking and baiting his sets is an ongoing process for Jimmy Pierce throughout the trapping season. Sometimes the traps might hold a bobcat or a beaver. Even when his efforts yeild nothing, Pierce says, you can't beat the views from his "office."

The classic bowline, sometimes called the "king of knots," probably comes as close as possible to being an all-around perfect knot.

MELISSA McGAW

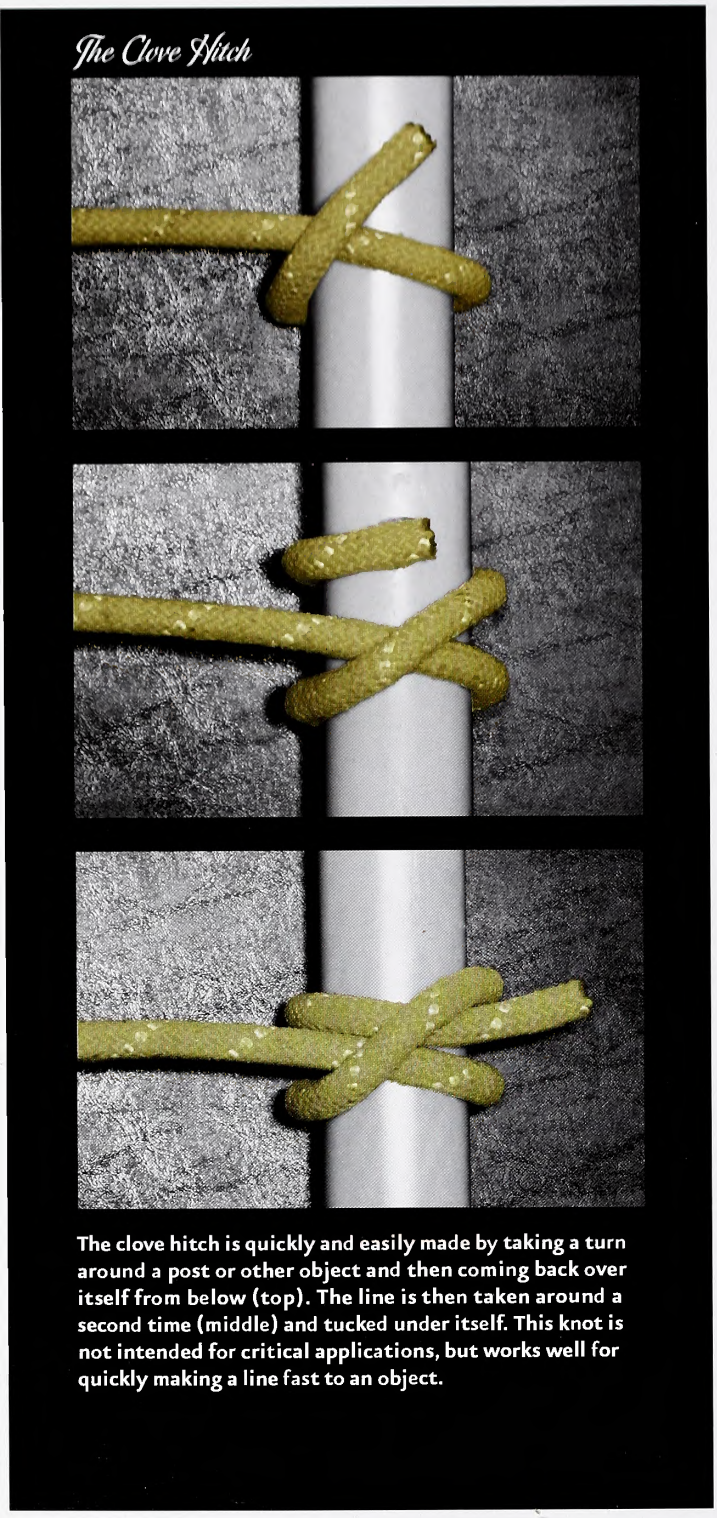
Fit to be Tied

Knowing what knot to use — or not use — can solve some knotty outdoor problems. WRITTEN AND PHOTOGRAPHED BY MARK JOYNER

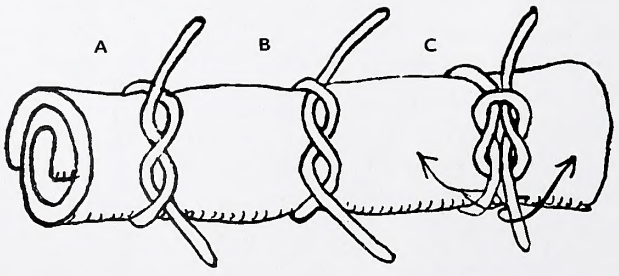
IT'S A SUMMER AFTERNOON AND A PERFECT DAY TO STRING UP THE HAMMOCK BETWEEN A COUPLE OF TREES IN THE BACK YARD. SOME TRUSTY ROPE, A FEW DEFT TURNS AROUND A TREE TRUNK, AND YOU'RE READY TO . . . TAKE A TUMBLE? EMBARRASSING, YES, BUT IT COULD BE A LOT WORSE. IMAGINE IF THOSE SAME KNOTS HAD BEEN TRUSTED FOR SOMETHING MORE SERIOUS, SUCH AS A REAL-LIFE RESCUE ON A MOUNTAINSIDE OR SIMPLY LASHING A CANOE TO THE TOP OF A CAR. IT QUICKLY BECOMES CLEAR THAT A KNOT IS EITHER EXACTLY RIGHT OR IT IS HOPELESSLY WRONG.

The author of that last line was Clifford W. Ashley, whose 1944 masterpiece "The Ashley Book of Knots" remains the final word on rope creations of every kind. Convinced there was a perfect knot for every conceivable situation, Ashley's passion was to chronicle the history and practical use of nearly 4,000 knots. Among some 7,000 original illustrations, you'll find everything from the double bastard weaver's knot to the man o' war sheepshank, not to mention the hangman's noose. (Although superstition calls for an uneven number of turns, Ashley maintained that the proper hangman's noose should be made with eight turns and applied just below and in back of the left ear.)

Of course, most of us aren't so deadly serious about our knots. Someone has even pointed out that the hangman's noose is the only knot that can save a life when it *doesn't* work. Still, it's interesting to look at which receive the highest (and lowest) ratings from so notable a source. Many people would be shocked, for instance, to find the common square knot branded as the most dangerous of all knots. Ashley goes so far as to say that it's to blame for more injuries and deaths than all other knots combined. How can it be that an innocent knot harbors such a potentially fatal flaw?



The clove hitch is quickly and easily made by taking a turn around a post or other object and then coming back over itself from below (top). The line is then taken around a second time (middle) and tucked under itself. This knot is not intended for critical applications, but works well for quickly making a line fast to an object.



Three binding knots (left to right): the half knot (A), left-handed half knot (B) and square knot or reef knot. The square knot is commonly used for tying up parcels and bundles, but does not work well for other applications because of its tendency to spill.

The answer lies in its application, one in particular in which it is an absolute disaster just waiting to happen. The hazard comes to light when the square knot is used to innocently tie two lines together. This fairly common practice is actually recommended for such everyday use by some sources. The knot makes up neatly, looks secure and holds very well, but only as long as the load on it remains steady and directional.

However, if the lines happen to be of different diameters or stiffnesses or are subjected to play, the square knot collapses upon itself without warning and releases. More technically, it tumbles into two half hitches, which then slide through each other with alarming ease. In the days when there were such things as parlors, this was considered a neat parlor trick. Two boys would tug at opposite ends of a line tied with a square knot. When nudged just so by a prankster, the knot would fly open and send both parties sprawling.

Learning the hard way

I'm embarrassed to admit that I found this out the hard way on a whitewater canoeing trip years ago. My friend and I had decided to hand-line our canoe through a boiling set of rapids, and for some forgotten reason we thought it would be good if one of us stayed on board to fend off the rocks. After tying a long rope to the canoe's stern with a square knot, I began easing my friend downriver. It went well at first, until the jostling caused the ropes to suddenly release, and he was instantly swept away. Thankfully, everything worked out alright, but the scare led me to appreciate that a poorly chosen knot can have some very serious consequences. (And Jinks, if you're reading this, I'd like to apologize once again!)

The square knot does have plenty of uses for practical needs such as tying up a bundle, for which it's perfectly suited. Its easy-spilling trait actually becomes an asset aboard ship where it's known as the reef knot, referring to its use of binding (reefing) a furled sail. However, if the "left over right, then right over left" is done incorrectly, it forms either the dreaded granny knot—bane of Boy Scouts everywhere—or the clever thief knot. The latter was set as a trap by sailors who suspected someone might be tampering with their sea bag. The intrusion could be immediately detected if the knot wasn't retied in the same precise manner.

The Square Knot

The square knot has been blamed for more injuries and deaths than all other knots combined. The danger arises when the knot is used to join two lines together as shown. That's especially true if the lines are of unequal size or stiffness.

The square knot has even been found in some very unlikely places. Gorillas have been known to weave vines and branches into their nests with square knots and grannies. Though probably the result of chance, as many as two dozen such knots have been found in a single large nest of the great apes.

For lowering your best friend down the river of no return, however, there's a better choice, and that's the sheet bend. Already old by the time of the ancient Greeks and Romans, the sheet bend dates from the Stone Age period. It's been found in the ruins of prehistoric settlements dating back at least 4,000 years. Luckily it holds just as well in today's ropes as it did in the twisted fiber cordage of that era.

The sheet bend was created specifically for binding lines together quickly, and it excels for a variety of reasons. It's easy to tie, and can be made up in the wink of an eye by a practiced hand. It works especially well when the ropes to be joined are of unequal diameter or thickness, and can be useful for joining a number of short lines into one length. As for its name, on board a ship the lines attached to sails were known as sheets, and any deckhand could tell you that lines should be *bent* together, not tied.

And just for the record, rope is cordage that has no designated use, whereas line is rope that serves a specific purpose. On board a vessel, all cordage is generally referred to as line.

The quick release

The sheet bend usually loosens easily after use, but it can jam under tension. The savvy knot tier takes the precaution of building in a quick release feature. The knot is said to be slipped, and ready for instant release. While many knots can be slipped in a way that helps them loosen, most still require some wheedling to come undone. Not so the sheet bend; it practically explodes open when the release line is tugged, even if it's still under full load. The trait recommends it for situations that demand urgency, such as casting off from a dock when you're being chased.

A more common knot often found around docks, whether tied intentionally or not, is the clove hitch. Although not recommended for critical applications, it serves well when a line needs to be quickly made fast to an object, whether that's a piling, a tent stake, a tree or possibly even another rope. It can be tied quickly, is easily adjusted and is held by Ashley to be the most practical general utility hitch around. Two loops thrown over a piling form a clove hitch automatically, if the loops are made in different directions. Like the sheet bend, it was well known in ancient times: Archaeologists uncovering the riches of Tutankhamun's tomb (built circa 1325 B.C.) were surprised to find a clove hitch securing the door.

One of the most useful things to do with the clove hitch is to modify it into the constrictor knot, with which I once had a rather humbling experience. I was testing its suggested use as a handcuff knot and had to call my wife to come untie me from my garage bench. Let's just say it has an awesome ability to clinch down like a ratchet, and may have to be cut loose. I've since used it numerous times for less sinister needs such as a makeshift hose coupling and a clamp for gluing. And here's hoping you don't need it, but the Greek physician Heraklas in the first century A.D. recommended its use as a top-notch surgical sling.

Hitches in general are considered the workhorses of knots, and the variations are plentiful. Most everyone is familiar with a simple half hitch, which is often used to finish off and secure other knots. Two half hitches around a line actually form a clove hitch. The rolling hitch has been promoted as the only knot to tie around yourself in the event you've fallen overboard but are able to catch hold of a line. And the ever-versatile taut-line hitch is a favorite with campers

The Sheet Bend

Join two lines quickly by first bringing one line up through a bend made in the other, and passing it behind from right to left (top). Then bring the yellow line back to the front and slip it under itself (middle). To build in a quick release, instead of inserting the line end under itself at the last step, tuck in a short loop that leaves a pull-end free. A quick tug on this end instantly spills the knot.

The Bowline

The key to mastering the bowline is to make it the same way every time. Always start with the bowline loop on the left, which must be made just so for the knot to work. The end of the line goes around (or through) the object you're tying to and emerges on the right (top left). The end is passed from behind up through the loop and pulled down (top right). It then goes behind the standing line (bottom left) and is brought up to be tucked down into the loop. Take care to dress it properly, and you're set.

for keeping a tent line tight. In a modern-day twist, it was even employed by astronauts during one of the missions to repair the Hubble Space Telescope.

The beauty of a bowline

Every knot has its limitations; maybe it's easy to tie but hard to loosen, or strong without being particularly secure. Yet there is one knot for which Ashley reserves his strongest praise, and that is the bowline. It probably comes as close as possible to an all-around perfect knot, leading to the adage that "the devil would make a good sailor if he could only tie a bowline." Even so, it was not Ashley but the British poet Sir A. P. Herbert who bestowed upon the bowline its deserved stature with the following lines:

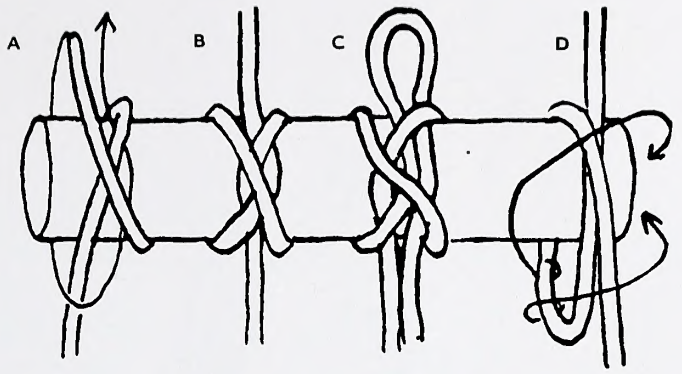
But the bowline is the king of knots,
and it is grand to say
Here is a thing that never will be done
another way!

The beauty of this knot is in its simplicity and strength, evidenced by how it grows stronger as the load on it increases. It neither slips nor jams, yet it can be loosened afterward with relative ease. It's also quick and easy to tie; by the time they were 6 years old, all three of my sons were tying bowlines on wagon handles that could just as easily pull a car out of a ditch. What's more, they could do it blindfolded if need be!

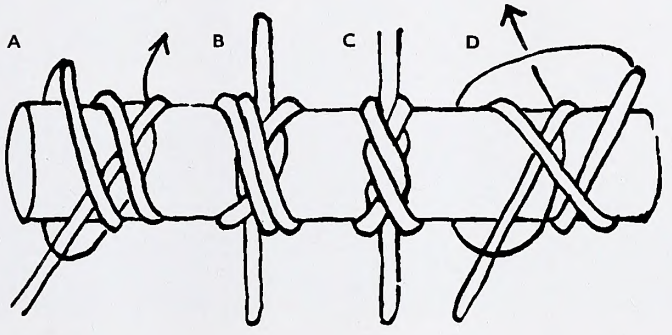
The bowline's usefulness in outdoor settings is legendary. Rescue workers and climbers routinely depend on the bowline for its trustworthiness. Lines joined together with two bowlines offer the ultimate in both strength and security, better even than the sheet bend to which it is closely related. A first-class noose is formed by making a bowline loop at the end of a line and then feeding the line back through. The result is called a running bowline, and can be employed as a snare or a lasso. It can even be tied with one hand, a useful trait if you are hanging on to the side of a cliff awaiting rescue.

Yet even the bowline has its limitations, the most obvious being that it can't be tied or loosened while under load. (A quick release can easily be built in, but it's nowhere nearly as effective as that of the sheet bend.) The result is that many situations call for a combination of knots. For instance, the hammock setup might well start with a bowline onto one tree, with the stretched line made fast to the other tree with a clove hitch that can be adjusted as needed. If the line won't reach all the way to the second tree, you can even throw in the sheet bend to achieve a knot hat trick.

Sixty-two years after Ashley's monumental publication, a working knowledge of knots remains as valuable as it was in the heyday of the clipper ships. The difference is that whalers and stevedores have now been replaced by recreational boaters, campers, hikers, climbers and those of us who enjoy our times outdoors. The value of a fine knot endures, however, and we still find ourselves in need of knots that are truly fit to be tied. ◆



According to Ashley, the constrictor knot (top A and B) is the most secure of all binding knots and can be used in a variety of applications. A slip (top C) may be added to simplify untying the knot. The constrictor may also be tied on a stake or roll (top D). With an extra turn, the knot will provide a wide whipping (bottom A and B). The final knot pictured (bottom C and D), which Ashley does not name, is also used for whipping.



ALL ILLUSTRATIONS FROM "THE ASHLEY BOOK OF KNOTS" BY CLIFFORD ASHLEY, COPYRIGHT 1944. USED BY PERMISSION OF RANDOM HOUSE, INC.

Mark Joyner is executive vice president of the North Carolina Aquarium Society.

AN ARTFUL CALL

A HANDFUL OF ARTISANS COMBINE FUNCTION AND ART TO FASHION TURKEY CALLS OF A DIFFERENT FEATHER.

In full strut, there are few things in the wild more beautiful than the fan of a turkey gobbler. In an April sunrise, the iridescent feathers shine in hues of black, green, brown and blue, from the base of his tail to the strip of tan along the tips of his feathers. It is a sight that puts the NBC peacock to shame.

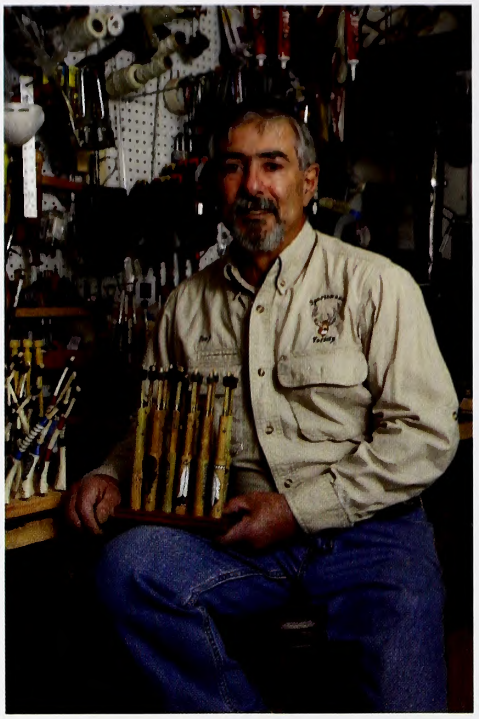
Turkey hunters don't really need to be reminded of that beauty, but that doesn't stop people like Jeff Valentine, Tony Quarino, Don Carter and Ed Wynn—artisans who double as artists when they're in their woodworking shops—from creating turkey calls that hopefully will trick a gobbler into entering his show off mode a little too close to the end of a shotgun barrel.

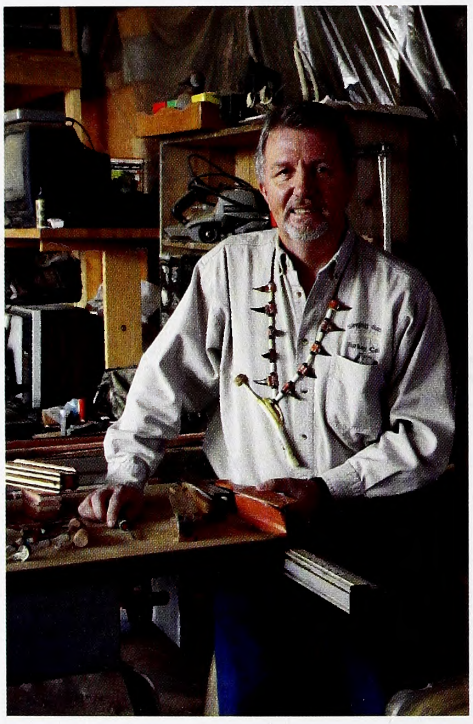
For those four—and others around the state and country—there's more involved in their craft than just making a call that sounds good. It's putting the touches of an artist on the paddle of a box call, the striker of a friction call, on a wingbone or even on a slate call created from the shell of an unlucky turtle that climbed across one rail of a train track but couldn't make it across the other.

As good as a well-tuned turkey call may sound to a lovesick gobbler, a well-made call adorned with a touch of artwork will look just as appealing to many a hunter who appreciates the memory that it might evoke—of youthful forays in the field with fathers and grandfathers or maybe of the joy that a child's first gobbler brings.

WRITTEN BY DAN KIBLER PHOTOGRAPHED BY PETER HUTSON

Box calls can either be adorned with paintings or constructed of uncommon woods to provide a unique look.





A quartet of talented Tar Heel craftsmen who make and decorate their own calls: (clockwise from top left): Jeff Valentine of Wake Forest, Tony Quarino from Waxhaw, Ed Wynn of Hertford and Don Carter from Merry Hill.

Valentine, Quarino, Carter and Wynn bring out that little extra with the artistic touches they add to turkey calls, whether they're box calls made of beautiful laminated woods (Don Carter), turkey tracks and feathers painted on wingbones wrapped in ornate and colorful thread (Tony Quarino), an exquisite wood-burning of a hunting scene that wraps around the sides of a box call (Ed Wynn) or the detailed painting of a tail feather along the paddle of a box call (Jeff Valentine).

Call-makers all, each one of them came to be big names among sportsmen who collect beautiful turkey calls, either to tree yelp to a gobbler still on his roost or to draw stares in a glass collector's case. Some of the call-makers began decorating their work by happenstance; for others it was as a natural progression from working with paints, wood or leather.

"I was in a car wreck, and while I was recovering, I just started playing with turkey calls," said Valentine, a building contractor from Wake Forest. "I just kept playing with them, and then Duane Raver (the noted wildlife artist and former *Wildlife in North Carolina* editor) painted on one of my calls. And I was in my shop doodling, he saw what I wanted to do, and he said I just needed an education in painting. He encouraged me and saw some of the stuff I just had sitting around, and he said, 'If you can do that, you're an artist.' He taught me how to use colors, and the next thing I knew, I was painting on turkey calls."

Valentine has sold box calls made in his wood shop with painted scenes of turkeys feeding, gobblers strutting, with tail feathers painted on the lid, anything that strikes his fancy. "A lot of art collectors will buy my calls. I've had guys who've bought a few of my calls who just wanted them to put up on their mantel, but some of the people who buy them hunt with them. Once you make a call and call a bird in with it, you're hooked. Some calls I really get into; I just keep working and working on them."

Quarino, a retired electrician from Waxhaw, first began making crafts about 20 years ago, but did not immediatly turn his hand to turkey calls. He specializes in field-grade wingbone calls, but with a couple of twists. He sells about 100 to 150 wingbones a year that are dressed with decorative thread, much like the decorative wrap on a custom-built fishing rod, often with a tail feather or turkey track drawn on the bell of the call. "It took a while before I got [call-making]

"THERE ARE SOME CALLS YOU MAKE, THE FIRST TIME YOU STRIKE IT, YOU SAY TO YOURSELF, 'THAT'S THE SOUND. THAT'S A KILLER.' YOU KNOW THE SOUND TURKEYS LIKE, AND THAT CALL HAS IT." - DON CARTER

down," he said. "You learn how you have to bleach it; you learn where you have to cut the bone to get it right. You have to put it together right to get the right sound. I just started hand-painting them with tracks and feathers and wrapping them with thread, just trying to fix them up a little."

Through trial and error, Quarino has found that the best wingbone calls don't come from gobbler wings. "I've got friends up North who hunt in the fall, and they'll send me hen wings," he said. "Although a gobbler bone is good, in order to make an excellent wingbone, you need hen bones. And I use some snow goose wingbones, because it makes a good mouthpiece for a wingbone call."

"If a wingbone has a wide end, I might do a turkey's head or a track. It's simple to do with acrylic paint, and it just makes them look a lot nicer. I use black nylon thread, and I like to put a black feather and the black thread on; that really makes it look nice. But I've gotten into using different colors."

Quarino's original talent was leathercraft, then he moved on to belt buckles and finally turkey calls. He makes some box calls, but instead of decorating them with paint, he does checkering work or parquet inlays in the paddles. "So many guys are making box calls, I wanted to do something a little different," he said. "It took a long time before I got one that sounded decent, but I finally got it."

Carter, of Merry Hill, doesn't consider his Singing Sam's Turkey Calls artwork, more because he considers himself less of an artist than a call-maker and woodworker.

"I wish I had that kind of artistic ability," he said. "There are some fellows out there who are wonderful artists who know woodworking, and they can make some beautiful things," said Carter, who works for Weyerhaeuser. "I was lucky to grow up in my family. My father was one of the few turkey hunters in Onslow County back then, and the only place you could hunt was Camp Lejeune.

A sampling of Quarino's wingbone calls and yelpers shows the artistic touches — the thread wrapping and hand-drawn tracks and feathers — that adorn his work.

"My dad and my granddad both used wingbone calls, and they both made their own and made them for friends, but they never commercialized it like I have. I made my first wingbone call in the '70s, out of a turkey I killed in 1978 — one of the first I ever killed.

"I got into woodworking a little bit right out of college, and I still make some furniture. Furniture and turkey calls are a hobby; they take a lot of time, but they pay for my habit. I went to Iowa, Missouri, Alabama and North Carolina last spring to hunt turkeys."

Carter graduated from wingbones to his specialty, box calls, around 1980. He will draw or paint feathers or turkey tracks on his calls, but what sets his box calls apart are the beautifully laminated woods.

"I'll use several types of wood — walnut, mahogany, Osage orange. But mine are made to kill turkeys. I have a box call I made in 2001, one of the first laminated calls I made — poplar, walnut and cedar, with a eucalyptus paddle — and there have been 30 turkeys killed in front of that box by me or some of my friends. I started writing on the side of the box the date the turkey was killed, the length of the spurs and the length of the beard for every turkey it killed."

Carter has made a few large, boat-paddle-type calls, but he believes them to be cumbersome for most turkey hunters to carry, considering the way hunting vests are made. Most of his calls are on the small side, he said, and they're rarely the same.

"There are some calls you make, the first time you strike it, you say to yourself, 'That's the sound. That's a killer.' You know the sound turkeys like, and that call has it," he said.

"But I wouldn't sell a call that I wouldn't hunt with. It's just that every piece of wood is just a little bit different. If you sand one side of the box just a little bit more than the other, you get a different sound."

Carter has made slate calls from the shells of turtles that customers have brought him, gluing in a piece of slate along the inside of the top of the shell, then another piece to cover the entire opening — which gives the call a tremendously deep sound chamber and a fantastic sound.

(Clockwise from left) Carter's tortoise-shell call with a turkey painted on the bottom and his laminated box call; Wynn's box call with turkey feather; and Quarino in his shop with the tools of his trade.

"I don't really do a lot of them, but if somebody brings you a shell, you make 'em a call," Carter said. "There's an engineer on the train that runs from Aurora to Washington, and he'll see 'em on the tracks and bring 'em to me to make calls for him. A lot of times, I'll paint the shell white, and then I'll draw a feather or a track on the back of the shell."

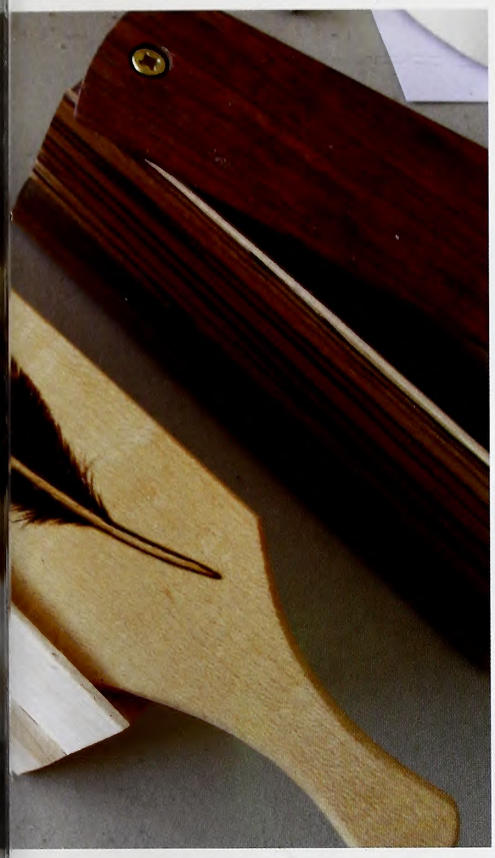
Carter is in possession of one slate call made from a turtle shell that Valentine produced several years ago. Valentine, using the linear and rectangular patterns on the back of the shell, painted a full-strut fan on one end of the shell. As often happens, custom call-makers will often trade calls among themselves, and Carter wound up with Valentine's shell.

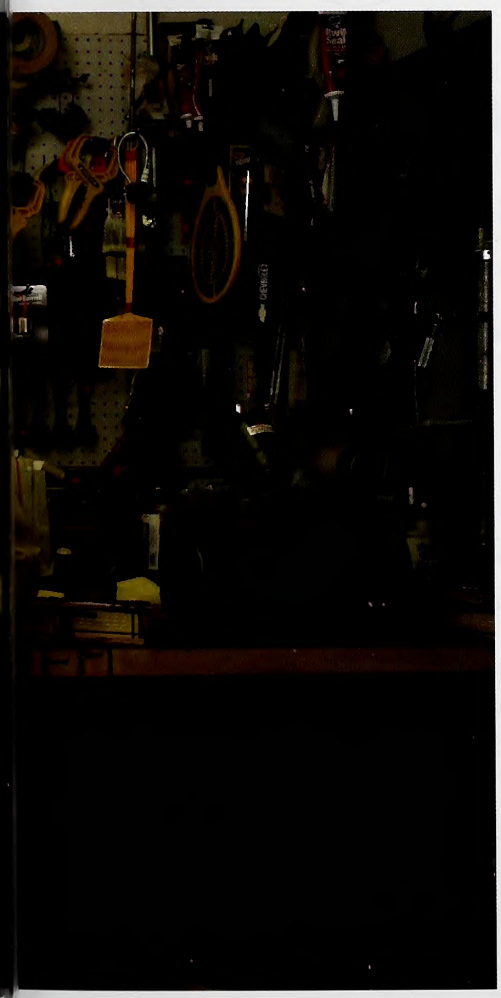
It's Carter's opinion that Wynn, a resident of Hertford who retired three years ago after 15 years as pilot of the FujiFilm blimp, is the best artist of them all, using his wood-burning and etching skills to make a run-of-the-mill call extraordinary.

"He's the best; he's a real artist. He can take a wingbone or take the paddle of a box call, and when he finishes, it's unbelievable," Carter said.

Wynn shrugs off that kind of praise, but admits that he's been some sort of an artist since an extremely early age.

"I'm 42, and my whole life, I've loved to draw and doodle a lot, then I turned to sketches and some painting. At one stage," he said, "I even had some prints done and tried to sell them. But everything was a stepping-stone. That's what happened with my artwork. I started manipulating some of





"...I DON'T FEEL LIKE I'M COMPETING WITH THE LARGER COMPANIES; IT'S MORE ME AND THE OTHER CUSTOM CALL-MAKERS." - ED WYNN

the calls I bought at the store, trying to make something a little better, and that was a sounding board for my artwork."

Nowadays, Wynn makes turkey calls full time, splitting his efforts between field-grade calls for hunters and custom, decorative calls for collectors.

"I don't know. I expect that not 10 percent of my custom calls ever hit the woods," Wynn said. "It's nothing you can go to Wal-Mart and buy, but it's different. It's a niche market, but a market where people are willing to pay a little more for a custom call. I don't feel like I'm competing with the larger companies; it's more me and the other custom call-makers."

Wynn really found his niche a half-dozen or so years ago when he was tinkering one night and made a decorative box call that he liked enough to take to the National Wild Turkey Federation convention in Charlotte and enter in the national call-making contest.

"When I walked into the convention and saw everything that was there, I felt like a duck out of water, but I thought, 'You're not different than anybody else in here.' Even though I didn't win one of the big awards, I got an honorable mention and I got to talk with some of the judges about the calls."

Wynn regularly etches or burns sketches of turkey feathers and tracks on to the paddle or sides of box calls, sometimes entire turkeys or even wildlife scenes. One of his favorites was a box call he made for a man from Williamston to celebrate a turkey hunting relationship. The call showed a scene of the hunter and his son walking, each with a turkey slung over his shoulder. The scene stretched around both sides of the box."

He also makes and sells decorative strikers for friction calls, with a drawing of a tail feather burned into the handle. He makes an occasional slate call and wingbone, and his business—Ed's Custom Turkey Calls—sells a total of 20 different items, but box calls are his specialty.

"I'm a fanatic about wood, and I used to make calls out of a lot of different varieties of wood. I'm really partial to zebrawood and purple heart and mahogany. Now, when I make box calls for [sporting goods] stores, I pretty much stick to purple heart for the lid and mahogany for the box.

"I still have four or five of my favorites here in a glass case, and I'll pull them out every spring after the season's been in three weeks, when the turkeys have heard everything else, and they'll bring them in. It's just something a little bit different, a slightly different tone, that the turkey hasn't heard, and that's enough sometimes."

Dan Kibler is a freelance writer from Winston-Salem.

CONTACT THE CALL-MAKERS

Don Carter, Singing Sam's Turkey Calls, Merry Hill, (252) 482-6810.

Tony Quarino, Sportsman's Variety, Waxhaw, (704) 843-0385.

Jeff Valentine, Wake Forest, (919) 761-3345.

Ed Wynn, Ed's Custom Turkey Calls, Hertford, (252) 426-1781.

The Passing of the Chinquapin

Highly regarded during colonial times, this cousin of the chestnut faded into obscurity in the 20th century after the chestnut blight. Oddly, few people seemed to notice.

Three years ago, while sorting through a box of my mother's papers, I came across a story entitled "The Passing of the Chincapin." It was written in the elegant, flowery handwriting of my great-grandfather, Maj. Newsom Edward Jenkins (of the Confederacy), around the year 1910. "A half century ago," it reads, "there was a common growth in the woods, hedges and fence corners of this country, known by the name of its fruits or nuts, bearing the name of Chincapin; and after the order of the Chestnut . . . Strange to say, that both now have nearly become extinct."

Written by Pat Garber
Illustrated by Tim Gunther

The chinquapin's greatest value, according to Purdue University's Center for New Crops and Plant Products, is in commercial chestnut breeding programs and as food and cover for wildlife.

The "country" Maj. Jenkins referred to was near Littleton, the small northeastern town where he was born in 1837. The "common growth" he wrote about was undoubtedly the Allegheny chinquapin (*Castanea pumila*), also known as American or common chinquapin, sometimes spelled "chinkapin." It grew throughout the southeastern United States, including his native North Carolina. It is, as he says, a close relative of the better-known American chestnut (*Castanea dentata*), which is now almost extinct in the wild.

Chinquapins were described by Capt. John Smith in his notes written on Virginia's Indians in 1612: "[They] have a small fruit growing on little trees, husked like a chestnut, but the fruit most like a very small acorne. This they call 'Chechinquamins,' which they esteem a great daintie." According to Phillip A. Bruce, author of the "Economic History of Virginia in the Seventeenth Century," native Virginia tribes dried the kernels, beat them into flour and converted them into bread, which, Bruce writes, was "reserved for the most important feasts and for the enjoyment of the werowances [leaders]."

Records also indicate that members of the Cherokee and Choctaw tribes gathered and used chinquapin nuts. The Choctaws ground them into flour which they used for bread when their usual crop of maize failed. Some tribes used the leaves to treat fever blisters, and a tea made from the leaves was used to relieve headaches.

CHESTNUT COUSIN

Chinquapins, sometimes called bush or dwarf chestnuts, are members of the beech (Fagaceae) family. There is some question about their taxonomy—some botanists consider *Castanea pumila* one species with two botanical variations: Allegheny and Ozark. Others list the Ozark as a separate species. Dendrologist (tree scientist) Richard Braham of N.C. State University describes *Castanea pumila* as "one moderately variable population with three entities: *alnifolia, floridara* and *ashei*." Allegheny chinquapins traditionally grew from New Jersey south to central Florida and west to Texas and Oklahoma.

Horticulturalist Rick Patrick of The Nursery at Ty Ty describes a rare dwarf, or Georgian, chinquapin (*Castanea pumila* "Georgiana") which grows in an isolated location in southern Georgia not far from the nursery. According to Patrick, it has an extensive, elephantine, spreading root system and begins bearing fruit when it is only 1 foot high. In spite of the name, *Castanea pumila* should not be confused with the chinquapin oak (*Quercus muehlenbergii*), a separate species of tree.

"The bushes of the chincapin rarely attained the dimensions of a tree," Jenkins wrote, "its nuts being also smaller and more of a corn shape" than the chestnut. These small trees reach a maximum height of 40 feet and trunk diameter of 1 foot, though most are much smaller—20 to 25 feet. They prefer moist, well-drained soil but also thrive in dry, sandy soil, growing from underground rootstalks and forming dense thickets. They do best in a habitat that is frequently subjected to fire. The bark of chinquapins is reddish-brown, furrowed into scaly plates; the leaves 3 to 6 inches long, of oblong shape and yellowish-green hue. They flower in early summer, forming slender, spiky catkins of strongly scented, small white blossoms which produce dark-brown, thin-shelled nuts.

According to Jenkins' writings, they were "the most common, the easiest gathered and the most enjoyable [of nuts.] They were often boiled, strung and put in numbers of strings around the necks of the younger children by their nurses, who often decorated the neat whitewashed walls of their rugged log cabins with lavish festoons of strung chincapins." The children played such games as "Jack-in-the-bush" and "Even or Odd" with chinquapin nuts. The boys, he said, "often carried their pockets full, while the girls from a country school, on a chincapin hunt, would have their sun bonnets partly filled with them, as they walked home bareheaded."

Chinquapin nuts were used extensively by early American colonists. The sweet nuts were eaten raw and roasted, and they were used as a potato or cereal substitute. Chinquapins contain tannin and have medicinal uses as astringents, tonics and as an external wash for fever. Leaves and roots can be used to make a coffee or tea substitute, and the wood can be used for fuel, charcoal and fence posts.

Patrick, whose plant nursery sells chinquapins, remembers his grandparents telling tales similar to the one my great-grandfather recorded. The trees were in plentiful supply then, he said, and they ground the nuts into meal and made them into cakes. They were an important addition to early American Christmas celebrations, but by the time Patrick was born, in the 1930s, the chinquapins were nearly gone.

The chinquapin's greatest value, according to Purdue University's Center for New Crops and Plant Products, is in commercial chestnut breeding programs and as food and cover for wildlife. Wild turkeys were found to prefer it to any other food. The center describes chinquapins as our most ignored and undervalued native nut tree.

CHINQUAPIN'S DEMISE

When I found my great-grandfather's essay I had neither heard of nor thought about chinquapin trees for many years, but it brought back fond memories. My first home, a day camp built by my father in Virginia, was named Camp Chinquapin after a large grove of the trees on the property. My older sister and brother remember picking and eating the nuts which grew in the thickets.

By 1910 chinquapins had become, as mentioned in the essay, "rather rare, instead of common, as once they were." In the years since then, the majestic American chestnut and, to a lesser extent the Allegheny chinquapin, have nearly disappeared from the landscape. Causes of their demise, according to Sandra L. Anagnostakis, an agricultural scientist at the Connecticut Agricultural Experiment Station, are two imported pathogens and, more recently, an insect.

The first pathogen, according to Anagnostakis, was *Phytophthora*, formerly referred to as water mold or root rot but now commonly called ink disease. It was probably brought to this country by ships trading in the East Indies or Asia. It spreads through the soil with the flow of water, hence its earlier nickname. It causes an infection which results in blackish-brown lesions that girdle the roots and root collar, killing the tree. The name ink disease comes from the inky-blue exudates which flow from the lesions.

Chinquapin and chestnut trees were reported dying from this pathogen in the early 19th century, and by 1896 both species were severely affected. A Mr. Jones of Riceboro, Ga., was quoted in 1912 as saying, "In 1825 from June to September I observed all chinquapins dying when in full leaf, fruit half matured." Extensive rain, which allowed the root rot to flourish, was believed to exacerbate the deaths.

Another pathogen is the fungus *Cryphonectria parasitica*, formerly *Endothia parasitica*. Better known as chestnut blight, it was identified

How Did Blight Kill the Chestnut?

See Nature's Ways, page 39.

in New York City in 1904. It arrived in this country on ships coming from Asia and spread rapidly, apparently reaching northeastern North Carolina well before 1930. It is transported from tree to tree as spores on animals and insects, destroying the inner bark and growing tissue of the trunk. New stems sprout from dead stumps and live for several years before being reinfected and dying.

During the years 1911 to 1913, the U.S. Congress appropriated special funds for its study and control, but with World War I on the horizon the funds were eliminated. By 1926 the fungus had made its way into all of the chestnut trees' range, and by 1940 all known American chestnut trees were either dead or infected.

Suppression of fire is believed to be one cause of the decline of chinquapins, and they seem to recover somewhat in areas where there are controlled burns. The most recent threat to the chestnut family is the chestnut gall wasp, brought to Georgia from Asia on cuttings. They have now made their way to southern North Carolina. According to J.A. Payne of the USDA Fruit and Tree Nut Research Lab in Byron, Ga., however, chinquapins seem to be resistant to the chestnut gall wasp, and may be useful in cross breeding that resistance into other species.

BETWEEN THE CRACKS

It appears that few dendrologists are aware of the severity of the chinquapin's decline in the last 200 years. Misty Franklin, a botanist at the N.C. Natural Heritage Program, said *Castanea pumila* is not one of the plants they monitor. Natural Heritage Program ecologist Mike Schafale said that he does not think of it as a rare species, but wondered, "Who knows how common it may have been before the chestnut blight?" David M. DuMond of Environmental Services and Consulting in Wilmington noted that chinquapins seem to be in decline in his area.

Jeannie Kraus, natural science curator at the N.C. Maritime Museum, has seen some in the Croatan National Forest around the Patsy Pond area, where there are regular prescribed

The loss of chestnut and chinquapin trees from the Eastern landscape has been called one of the greatest American tragedies.

burns. She had not noticed any disease there, and wondered if the fires might control the blight as the trees sprout back up. Cliff Ruth of the N.C. Cooperative Extension Service stated that while his information is anecdotal, he has seen extensive decline in the Henderson County area. He added that he had had a number of requests for chinquapins from people who wanted to grow them for wildlife. According to Bryan Heath of the N.C. Forest Service, chinquapins can still be found in the oak and hickory forests of Allegheny County, but they are not common.

There is an increasing interest in reintroducing chinquapin trees back to their original range. In 1896 A.S. Fuller, described as a nut culturalist, wrote, "from present indications this tree will be well worthy of cultivation as an ornamental shade tree, even if we leave out of the account its rapid growth, productiveness and delicious little nuts, which will be very acceptable for home use, if not possessing any great economic value."

A number of plant nurseries sell seedling chinquapin trees. Patrick's nursery advertises that chinquapin nuts are sweet and "sell quickly at roadside markets." One tree, they say, can produce gallons of nuts in a year. Patrick believes that the chinquapin will be reintroduced on a large scale as soon as the U.S. Department of Agriculture gets interested in it. Scientists Jerry A. Payne, George P. Johnson and Gregory Miller promoted it in 1993 as "Chinkapin: Potential New Crop for the South" in their report for the 2nd National Symposium on New Crops.

The loss of chestnut and chinquapin trees from the Eastern landscape has been called one of the greatest American tragedies. Students of forestry have been trying for years to create resistant chestnuts by crossbreeding the American species with Chinese and Japanese chestnuts, and they are optimistic that they will succeed. Less research has been done with chinquapins. Scott Schlarbaum, a geneticist in the University of Tennessee's Department of Forestry, says that his department is growing high-quality chinquapin seedlings from nuts. Anagnostakis is doing some work with cross-breeding chinquapins at the Connecticut Agricultural Experiment Station.

It is hoped that the chinquapin tree of my great-grandfather's memory and the namesake of my first home will, along with the larger and better-known chestnut, return in the future to once more grace our Southeastern landscape. ◆

Pat Garber is an environmental anthropologist and writer living in Ocracoke. She is the author of "Ocracoke Odyssey" and "Ocracoke Wild," both available through John Blair Publishers.

Cooking with Chinquapins

The following recipes, which call for chestnuts, can be made with chinquapins:

Chinquapin Croquettes

Ingredients

1 cup mashed nuts
2 egg yolks
2 tbsp. cream
1 tsp. sugar
1/4 tsp. vanilla

Directions

1- Combine all ingredients.
2- Shape into balls.
3- Dip in egg and then crumbs.
4- Deep fry until golden.

Chinquapin Stuffing

Ingredients

3 cups nuts
1/2 cup butter
1 tsp. salt
1/8 tsp. pepper
1/4 cup cream
1 cup cracker crumbs

Directions

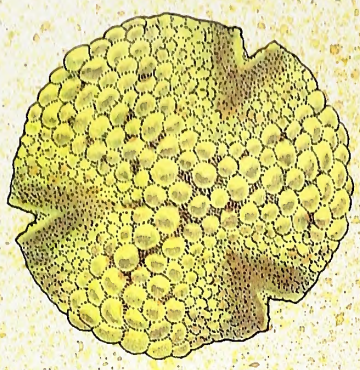
1- Blanch and shell the nuts.
2- Cook nuts in boiling water until soft.
3- Drain and mash nuts.
4- Add 1/4 cup of butter, salt, pepper and cream.
5- Melt 1/4 cup of butter and mix with cracker crumbs.
6- Combine with nut mix and bake at 350° for 1 hour or stuff into bird.

BUY CHINQUAPIN SEEDLINGS ONLINE

BOBTOWN NURSERY, MELFA, VA.: bobtownnursery.com
NEARLY NATIVE NURSERY, FAYETTEVILLE, GA.: nearlynativenursery.com
THE NURSERY AT TY TY (GA.): tytyga.com
WOODLANDERS, AIKEN, S.C.: woodlanders.net

**In spring and summer, it drifts in the air and covers the ground.
On a warm, sunny day, it floats on lakes and streams.
It clings to bees, birds and bats.
What is it?**

Pollen!



AMERICAN HOLLY

written by Buffy Silverman / illustrated by Consie Powell
nature activity by Anne M. Runyon

BLUE MASON BEE

To make a seed, a plant needs pollen. When a pollen grain combines with the ovule (egg) of a flower or cone, a seed forms. The seed can grow into a new plant.

CRAB APPLE

POLLEN ON THE MOVE

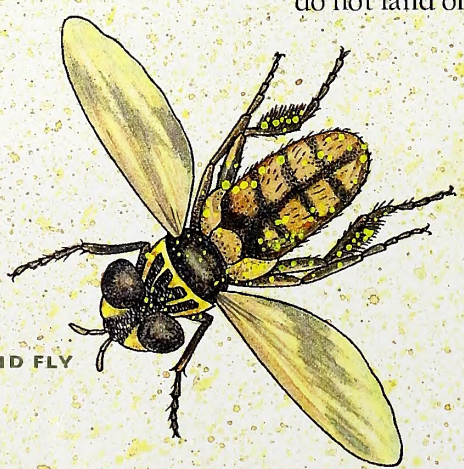
Plants send their pollen from one flower or cone to another in many ways. Colorful flowers rely on bees, butterflies, birds, bats or other animals to carry pollen. Some pollen floats in water from plant to plant. Many trees and grasses depend on the wind to deliver pollen.

Plants make lots and lots of pollen. A pine tree grows many small cones for making pollen. Each cone can make millions of tiny pollen grains.

Every pollen grain from a pine, spruce or fir tree has two tiny wings. When the wind blows, the pollen drifts away from the tree. The pollen, which is no bigger than a speck of dust, can be carried a hundred miles or more. A few of the millions of grains land on pine cones and make seeds. But most of them do not land on a cone. What happens to the rest of the pollen?

LIVE OAK

BLUEBERRY



TACHINID FLY

SPRING BEAUTY

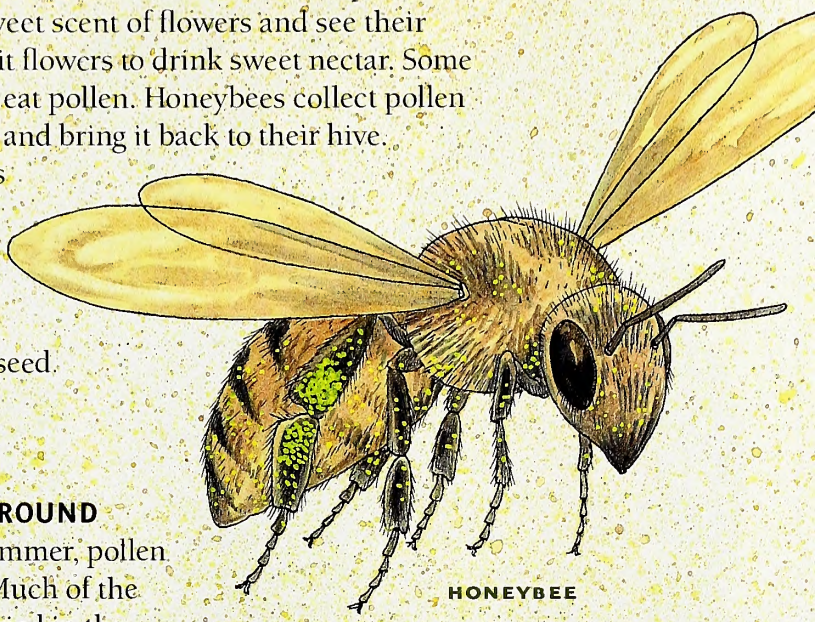
BLACK WALNUT

BITTERWEED

POLLEN AS FOOD

Plants make thousands of times more pollen than they need to fertilize their seeds. They make extra pollen as a reward for animals that make their pollen deliveries. Insects smell the sweet scent of flowers and see their bright colors. They learn to visit flowers to drink sweet nectar. Some insects also come to flowers to eat pollen. Honeybees collect pollen in special baskets on their legs and bring it back to their hive. Butterflies, moths, beetles, flies and birds also enjoy pollen. While they visit, some pollen gets stuck to their bodies. That pollen may land on another flower and make a seed.

EASTERN RED CEDAR



HONEYBEE

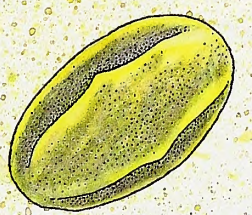
LONGLEAF PINE

POLLEN ON THE GROUND

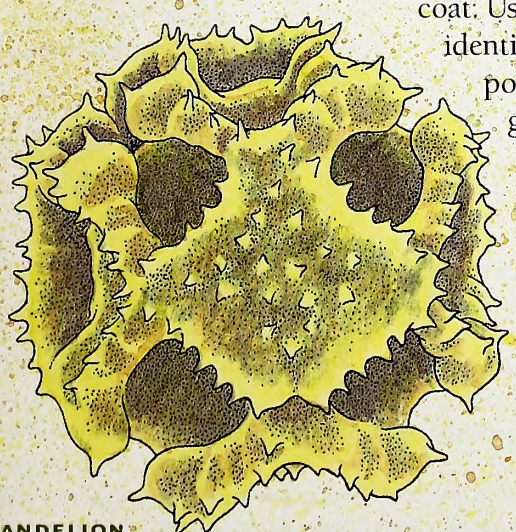
In the spring and summer, pollen lands everywhere. Much of the extra pollen gets buried in the soil. The pollen grains have a thick coat on the outside. The coat protects them and keeps them from drying out. The hard coat does not rot. Pollen grains can be buried in the ground for millions of years.

When you think of a fossil, you might imagine a dinosaur bone or an ancient human skeleton. One of the most common fossils that paleontologists study is pollen.

Every species of plant has a uniquely patterned pollen coat. Using high-powered microscopes, scientist can identify plants from their pollen grains. By studying the pollen grains found with ancient pots and tools and gravesites, scientists have learned what people ate thousands of years ago. They can tell how people's diets changed over time from the pollen they find.



AMERICAN CHESTNUT

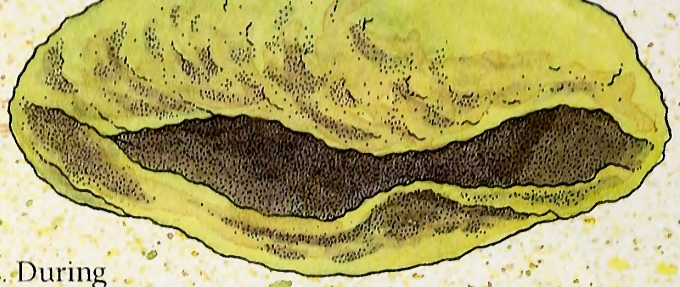


DANDELION

The greatly magnified pollen grains on these pages show just a bit of the great diversity of shapes and textures of pollen.

CHINQUAPIN

RED MAPLE



TULIP POPLAR

POLLEN IN THE PAST

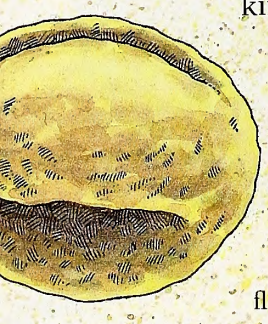
The climate of the earth has changed many times. During the ice age, North Carolina was covered with spruce forests like those now found in northern Canada. How do scientists know what our climate was like before people there were meteorologists?

Pollen gives us clues about the past. Different plants grow in warm and cold climates. Some plants grow in dry places and others grow in wet places. Scientists collect pollen to identify what plants once grew in an area. By identifying plants that grew in the past, they can tell if the climate was warmer or colder than it is now. They can tell if it was wetter or drier.

Using pollen found at the bottom of lakes, people learn about climate change. Every year, pollen from trees and other wind-pollinated plants lands on lakes. It sinks to the bottom and is trapped by sand and silt that flows into the lake. The next year, more pollen falls and mixes with sediments, covering the previous year's pollen. Just like tree rings, pollen and sediments are laid down in layers each year. Thousands of years of pollen can be found at the bottom of some lakes.

Scientists collect cores of sediments in tubes to discover what kinds of plants grew in the past. They identify the pollen in each layer. Using special chemicals, they can tell the age of the sediments and what plants grew at different times.

BUMBLEBEE

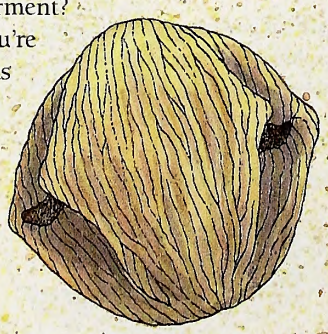


WHITE OAK

Get Outside

Visit a garden with blooming flowers. Look for pollen at the end of stamens (the male part of the flower.) Can you find differently colored pollen? Rub some pollen on your finger. Now brush the pollen on the pistil (female part) of another flower of the same species. You have helped the plant make a seed!

Look around to see where you might find excess pollen. Look on car windshields, on downed leaves in your yard or floating in ponds or birdbaths. Does the pollen appear different depending on where it's located? What happens to wet pollen when it starts to ferment? (Hint: use your nose if you're walking near bays or inlets along the edges of ponds surrounded with lots of trees.)



WILD CHERRY

Read and Find Out

- "Buds and Blossoms: A Book about Flowers" by Susan Blackaby, Picture Window Books, 2006.
- "The Life Cycle of a Flower" by Molly Alvian and Bobbie Kalman, Crabtree Publishing, 2004.
- "The Moonflower" by Peter and Jean Loewer, Peachtree Publishers, 2003.
- "The Reason for a Flower" by Ruth Heller, Putnam, 1999.
- "Seeds, Stems, and Stamens" by Susan Goodman, Millbrook, 2001.
- "Pollen: The Hidden Sexuality of Flowers" by Rob Kesseler & Madeline Harley, Firefly Books, 2006.

In *Wildlife in North Carolina*:

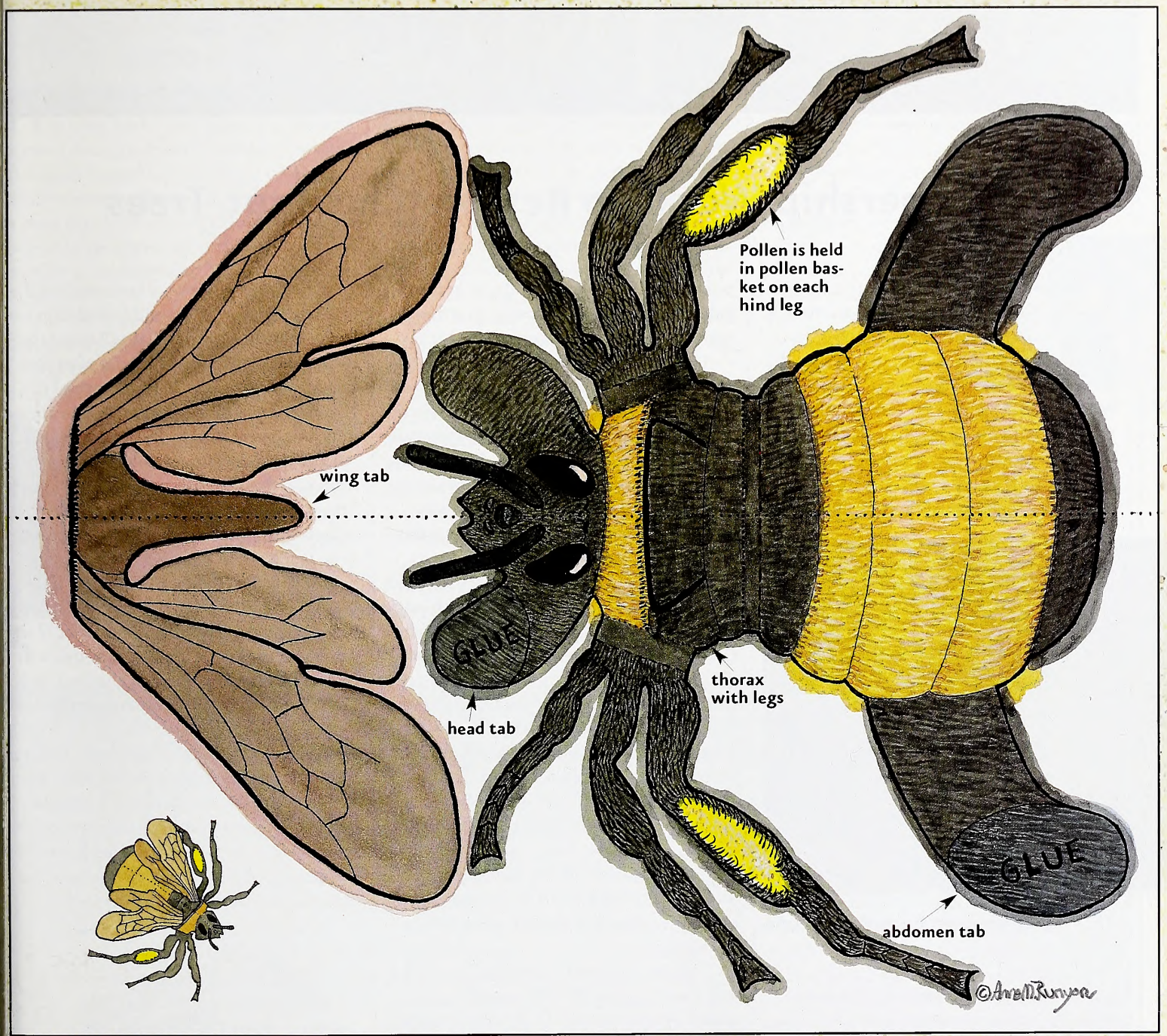
- "Birds, Bees & Pollen" by Carol Baldwin, April 1998.
- "Busy Blue Bees" by Logan Williams and Consie Powell, April 1999.

On the World Wide Web:

- Photomicrographs of fossil pollen: www.flmnh.ufl.edu/paleobotany/gallery/pg%2D31Lg.htm

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

The Bumblebee, A Big Buzz Pollinator



1) Cut out box and fold in-half along ··· line.
2) Keep folded, and cut out wings and body along black lines. Cut open the wing slot (on thorax).
3) Flatten wings and body.
4) Fold legs under thorax along ··· line, and out again along --- line.
5) Fold abdomen under thorax along ··· line, and out again along --- line.
6) Carefully slide wings into wing slot. Turn bee over and tape slot shut to hold wings in place.
7) Curl and glue head tabs together, matching the curve.
8) Curl and glue abdomen tabs together, matching the curve.
9) Glue tip of abdomen tabs to underside of abdomen.

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Partnership Works to Restore Chestnut Trees

Conservation organizations that support two iconic species in our nation, the wild turkey and the American chestnut, have joined together in a project that eventually could help both the bird and the tree. The National Wild Turkey Federation (NWTF) recently signed a memorandum of understanding with The American Chestnut Foundation (TACF) to aid that group's effort to develop and plant a blight-resistant chestnut.

NCWRC

Chinese chestnuts are resistant to blight.

The American chestnut tree was once abundant across the eastern half of the United States and west across the Ohio River Valley. However, in the early 1900s, an Asian fungus called blight (*Cryphonectria parasitica*) virtually eliminated the tree from nearly 9 million acres. The fungus causes cankers that eventually kill the tree back to its base. The tree will sprout again from its stump, but the fungus attacks it again before it can fruit.

The chestnut almost certainly was an important food source of wild turkeys, but because most mature trees disappeared before wildlife management developed as a profession in the early 1930s, scientists today can only speculate as to just how important the chestnut was to the birds.

The Eastern wild turkey also suffered a decline at approximately the same time as the American chestnut, but uncontrolled hunting was the major factor in dramatically reducing the turkey population. Stricter hunting regulations, habitat preservation and the turkey's remarkable adaptiveness have accounted for the bird's dramatic increases over the past 30 years.

In the East, a number of species replaced the American chestnut in forests, with oaks and hickories being predominant in North Carolina. Two University of Georgia scientists, John J. Morgan and Sara Schweitzer, compared the nutritional value of chestnuts and acorns—now a wild turkey staple—and found that "the American chestnut produces a superior nut in volume and nutrition." Unlike oaks, which often have poor mast crops, chestnuts were much more dependable and produced a nut that contains more protein, starch, carbohydrates and sugar. (Visit www.acf.org/wildlife_10.htm.to read more about the value of American chestnuts to wild turkeys.)

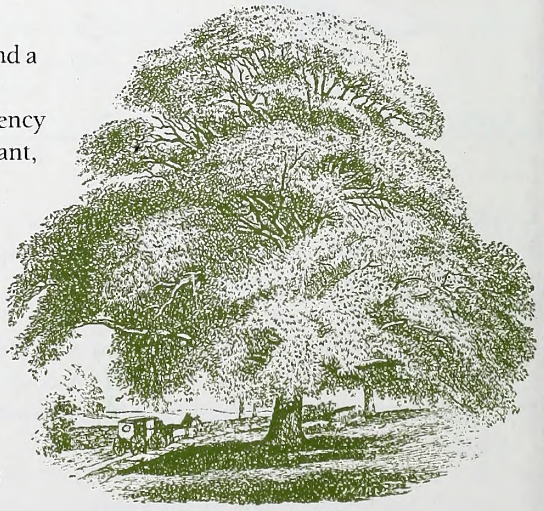
"Blight destroyed a beautiful tree, and a major food source of wild turkeys," said Robert Abernethy, NWTF director of agency programs. "Reintroducing a blight-resistant, American chestnut tree will benefit everyone, especially wild turkeys."

Through the agreement, the NWTF will work with TACF to plant blight-resistant chestnut trees in orchards to provide a future source of American chestnut trees. Together, the NWTF and TACF will work to improve forest health by eventually planting American chestnut trees to benefit wildlife in the eastern United States.

"The single purpose of both the NWTF and The American Chestnut Foundation has been to restore a species that will benefit forest health and many other species of wildlife," said Marshal Case, TACF president and CEO. "Given the wild turkey's preference for chestnuts, our partnership will serve to increase wild turkey populations and help restore the American chestnut to its native eastern forests. This is a wonderful opportunity for two volunteer-based organizations to come together to do fieldwork in the restoration process."

TACF is developing a tree that has the blight resistance of the Chinese chestnut while keeping the physical appearance of the American chestnut tree. The new tree will be over 94 percent American chestnut with blight resistance as the only remaining trait of the Chinese chestnut.

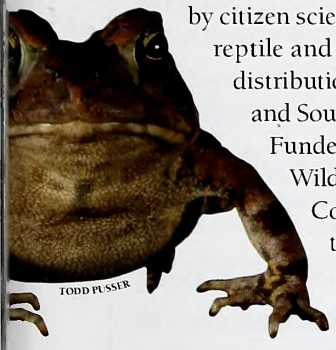
The restoration of the American chestnut tree is a long-term project. While there are some trees ready for planting, it will take many more years to develop enough genetic lines to begin to restore chestnuts across the eastern half of the country to increase the regional adaptability of the trees.



Carolina Herp Atlas Latest Citizen-Science Project

Have you ever seen an Eastern kingsnake in your back yard or found a Fowler's toad on your porch and wondered if wildlife biologists needed to know about it? These observations are important, and now there is a place to submit your observations that can help with the conservation of amphibians and reptiles in the Carolinas: The Carolina Herp Atlas (CHA).

The CHA, developed by the Davidson College Herpetology Laboratory and Davidson College Information Technology Services, is a new, online database that uses observations by citizen scientists to track reptile and amphibian distributions in North and South Carolina. Funded by the N.C. Wildlife Resources Commission, the CHA also allows users a simple way to maintain a personal database of the reptiles and amphibians they observe. County-level distribution maps can be viewed by anyone who visits the website. Wildlife biologists and herpetologists can use these data to understand activity periods, habitat relationships, distribution, conservation status and other facets of amphibian and reptile ecology in North Carolina.



TODD PUSSER

How does the CHA work? Before you can submit records at www.carolinaherpatlas.org, you must first register and set-up a "My Herps" account. Once you register, you are able to add records and keep track of your observations. Each observation should include: 1) state and county, 2) genus and species, 3) date, 4) location, 5) geographic coordinates (using our GeoLocator), 6) remarks, 7) and a digital photo for verification of the species identification. The GeoLocator allows the user to pinpoint the exact location of their herp observation.

ON PATROL

Lt. Todd Radabaugh, Sgt. David Jordan and Officer Joey Deal investigated a report of three men who captured a hatchling alligator in New Hanover County. The informant saw the trio take the alligator from a creek and asked them if he could take a picture of it. They allowed him to take a picture of the alligator in their hands, but made sure their faces were not in the photograph. The informant then obtained the license plate number of their vehicle.

ILLUSTRATED BY JACKIE PITTMAN

After much questioning, the officers obtained confessions from two subjects, one 16 years old and the other 26. The third subject, the father, never did confess. However, he was charged based on the detailed description from the informant and the photographs taken that showed this subject's hand with a deformed thumb as he held the alligator. The father and the older son each had been charged with unlawful possession of an alligator in the past. The father had four previous convictions of this offense.

Angler Releases Record Blue Catfish

There's a monster blue catfish out there in Badin Lake. Eric Fincher of Mount Pleasant knows it, because he caught and released the record-breaking catfish, certified at 89 pounds and 4 feet, 4 inches long, in the Stanly and Montgomery counties reservoir.

"I brought him in and pretty much went into shock," Fincher said. "He was too big for the net, but I told my wife I had to get him in the boat; he was a record-setter. And somehow, we did."

Unable to find certified scales that afternoon, Fincher took the giant blue catfish to his father-in-law's house, where he made a makeshift holding tank by damming a nearby creek. That was Nov. 25.

On Nov. 27, he located certified scales, and Lawrence Dorsey, a fisheries biologist with the N.C. Wildlife Resources Commission, was on hand to make things official. Fincher was fishing a live shiner at 18 feet in 43 feet of water, on 15-pound test line, while trolling for striped bass.

"The next day, Nov. 28, I took him back to the lake and he swam right off," Fincher said. "I'm confident he's still in there and getting bigger."

The previous record of 85 pounds, caught at Lake Norman, was set in 2004.

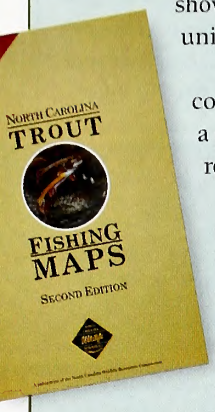
To qualify for a state record, anglers must have caught their fish on a hook and line, have their fish weighed on a certified scale witnessed by one observer, have the fish positively identified by a qualified expert from the commission and submit an application with a full, side-view photo of the fish. For a list of all freshwater fish state records in North Carolina, visit the commission's Web site, www.ncwildlife.org.

NCWRC

New Trout Maps Book Available

When planning your trout-fishing trip to the mountains, don't forget to pick up a copy of the recently updated *North Carolina Trout Fishing Maps Book*, published by the N.C. Wildlife Resources Commission.

The book, which costs $12, contains maps of all trout waters open to public fishing in western North Carolina. Maps are color-coded according to the signs posted on the streams and give anglers a guide to fishing regulations in effect on specific streams. The book also shows the locations of game lands and state parks and provides information on universally accessible facilities for anglers with disabilities.



This new edition includes a full-color trout identification page to help anglers correctly identify their catch. To make it easier for anglers to find a stream with a particular regulation, such as delayed harvest, each map shows only the regulations in effect for that county.

Purchase the book by:

- Phone: 1-866-945-3746.
- Mail: N.C. WILD Store, 1710 Mail Service Center, Raleigh, N.C. 27699-1710.
- Internet: Click on the N.C. WILD Store link at the commission's Web site, www.ncwildlife.org.

Individual maps can be downloaded free from the Web site.

Crazy About Turkeys

During the holidays, an average of 675 million pounds of turkey is eaten each year. Other than the fact that it tastes good, what do most people really know about this bird or its wild cousins?

The wild turkey is one of the N.C. Wildlife Resources Commission's success stories. They were common throughout state in the days of the early settlers, but through decades of unrestricted hunting and habitat destruction their numbers drastically decreased to about 2,000 birds. Now, through a successful management plan, the numbers are back over 100,000 and wild turkeys are found in every county of the state.

In an effort to encourage children to learn more about the wild turkey, Centennial Campus Center for Wildlife Education held a Crazy about Turkeys contest in November. Participants ranged in age from 5 to 15 and were allowed to use any medium they chose. There was a total of 157 entries. These entries included sculptures, oil paintings, pencil and crayon drawings and poems. Several classes from local schools did a lesson on turkeys in the classroom and then participated in the contest as part of the lesson.

All the participants were talented and the judges' decisions were difficult, but in the end three winners and four honorable mentions were selected from all the entries.

FIRST PLACE	Samantha Cooney, age 9
SECOND PLACE	Madison Adams, age 8
THIRD PLACE	Jasmine Gill, age 14

HONORABLE MENTION: Paul Matranga, age 9; Ramon Sanchez; Tina Sanchez, age 11; and Hannah Smith, age 5

IN SEASON

This month, these hunting seasons are open in North Carolina:

Snow, Blue and Ross' Geese: Through March 3.

Check the *2006–2007 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

CALENDAR OF EVENTS

Friday–Sunday, March 2–4

See some of the top white-tailed deer taken in North Carolina over the past year, plus the latest in hunting and outdoor equipment at the Wake County Wildlife Club's 27th annual Dixie Deer Classic on the N.C. State Fairgrounds. Hunters also may have deer jawbones aged by Wildlife Commission biologists and have their mounts scored. Visit www.dixiedeerclassic.org.

Saturday, March 17

Check out Reptile and Amphibian Day from 9 a.m. to 5 p.m. at the N.C. Museum of Natural Sciences in Raleigh. Visit www.naturalsciences.org.

Saturday, March 24

Improve your fishing skills at the Get Hooked Fishing School at the N.C. Aquarium at Pine Knoll Shores. Participants will take part in four sessions taught by experienced anglers who will share tips and techniques on such topics as inshore fishing and offshore bottom fishing. Registration fee prior to March 1 is $35, and $45 thereafter. For registration, contact Pam Pittman at (252) 247-4003.

Saturday, March 31

Celebrate the outdoors during the Spring Nature Fair at Fayetteville's Clark Park Nature Center from 10 a.m. until 2:30 p.m. The event features hands-on activities and exhibitors presenting topics on natural resources and outdoor adventure recreation. Call (910) 433-1579.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Applicatian must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Applicatian must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing. $250
  (N.C. residents only—includes basic inland fishing, traut & trout waters on game lands)
- ☐ Comprehensive Hunting. $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman. $500
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A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

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Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

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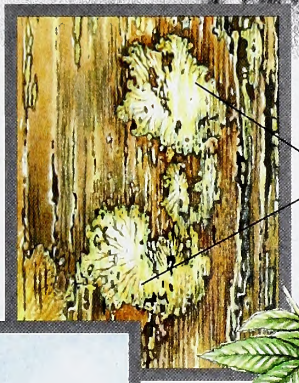
How Did Blight Kill The Chestnut?

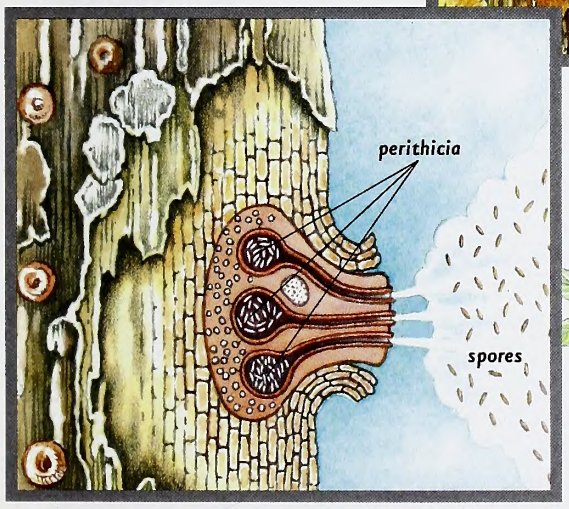
written by Clyde Sorenson
illustrated by Jim Brown

THE AMERICAN CHESTNUT WAS ONCE the dominant tree in North Carolina's mountains, but it was laid low by a tiny fungus, *Cryphonectria parasitica*, introduced from Asia. Chestnuts persist throughout the high country, but only as thin sprouts rather than majestic trees.

Once the spore gains entry, fungal hyphae grow into the living cambium and inner bark of the tree. The fungal masses kill the phloem, or nutrient conducting, tissue of the stem. Eventually, the fungus girdles the stem, killing everything above the canker. The fungus continues to spread in the dead stem, and grows down towards the crown of the plant.



The spores of the fungus that causes chestnut blight are spread on the wind. They need a wound of some sort, inflicted by storm damage, insect attack or some other cause, to successfully invade the chestnut stem.



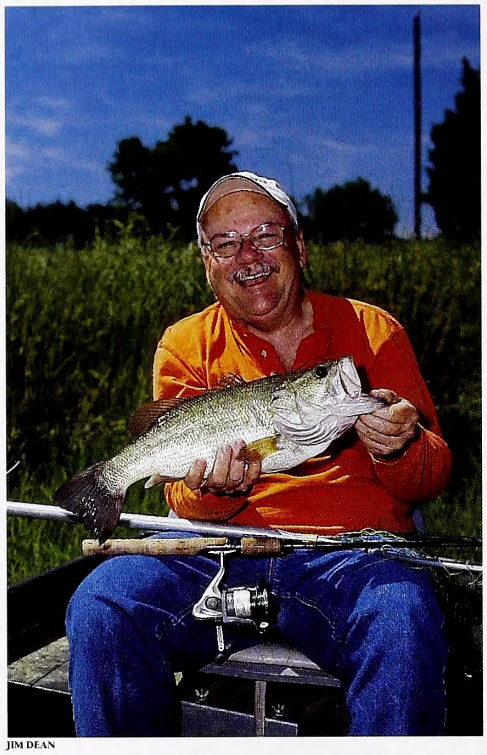
When environmental conditions are right, the fungal masses produce fruiting bodies called perithicia that erupt through the bark and eject thousands of spores to the wind.

Unlike many other fungal diseases of trees, chestnut blight doesn't invade the roots. Tough survivors that they are, American chestnut stumps continue to send new shoots up year after year, only to have them killed by the fungus, usually before they get a chance to set a crop of nuts.

Ponds For Spring

written by Jim Dean

All fishermen push the season this time of year. We are mortally weary of winter and suffering near-terminal cases of "mal de cabin." Not only are we thoroughly sick of football and basketball (and TV poker, billiards and Emeril), our arteries are clogged with potato chips, and we've got suppurating sofa sores.



JIM DEAN

David Nifong with bass.

Unfortunately, most of our early season angling options are not very promising. Surf fishermen are likely to find little more than dogfish, skates and toadfish, if they find anything at all. Largemouth bass in big lakes seldom respond with any enthusiasm until the water temperature climbs into the 50s, and mountain trout opportunities are hours away (where any spell of balmy weather can quickly turn ugly). We suspect that shad or white bass may be running, but that's a big maybe. Despite these bleak prospects, when the daffodils begin dancing we're ready to pop the clutch on another season somewhere.

"When the daffodils begin dancing we're ready to pop the clutch on another season somewhere."

Farm ponds have been my best bet through the years. There are more than 100,000 ponds in North Carolina, and you should be able to get permission to fish a few that are nearby. If so, you can quickly be on the water any afternoon without going to a lot of trouble. Nor will it take long to find out whether you're wasting your time. On a pond of only an acre or so, you don't have to worry about finding fish. In such a confined area, they are going to see your lures or bait, so if nothing is going to work, you'll know it soon enough.

Here's what's worked for me over the years. First, I've had my best early season fishing in ponds that have relatively clear water, especially those exposed to full sunlight (such as a pasture pond). It's not that clear water will necessarily be warmer than muddy water, but sunlight more easily penetrates clear water and many pond species (especially largemouth bass) will often move into the shallows on a sunny day to bask in those direct rays. As their bodies warm, they begin to think about having a snack (sound familiar?).

If the wind's blowing, I like to fish the windy side. Some fishermen believe forage species are blown toward windward banks, but I doubt that. Instead, I suspect wind stirs up food that attracts forage, and the presence of forage in turn attracts larger fish. At any rate, wind-rippled water helps conceal you from fish basking near the surface.

I like to fish from a small john boat because I prefer the comfort of a seat and I want all my mess within easy reach. But, where possible, walking the banks may be more productive. There's less risk of spooking fish with the boat or electric motor, nor will you scare the living daylights out of every bass within reach by accidentally banging a paddle against an aluminum hull.

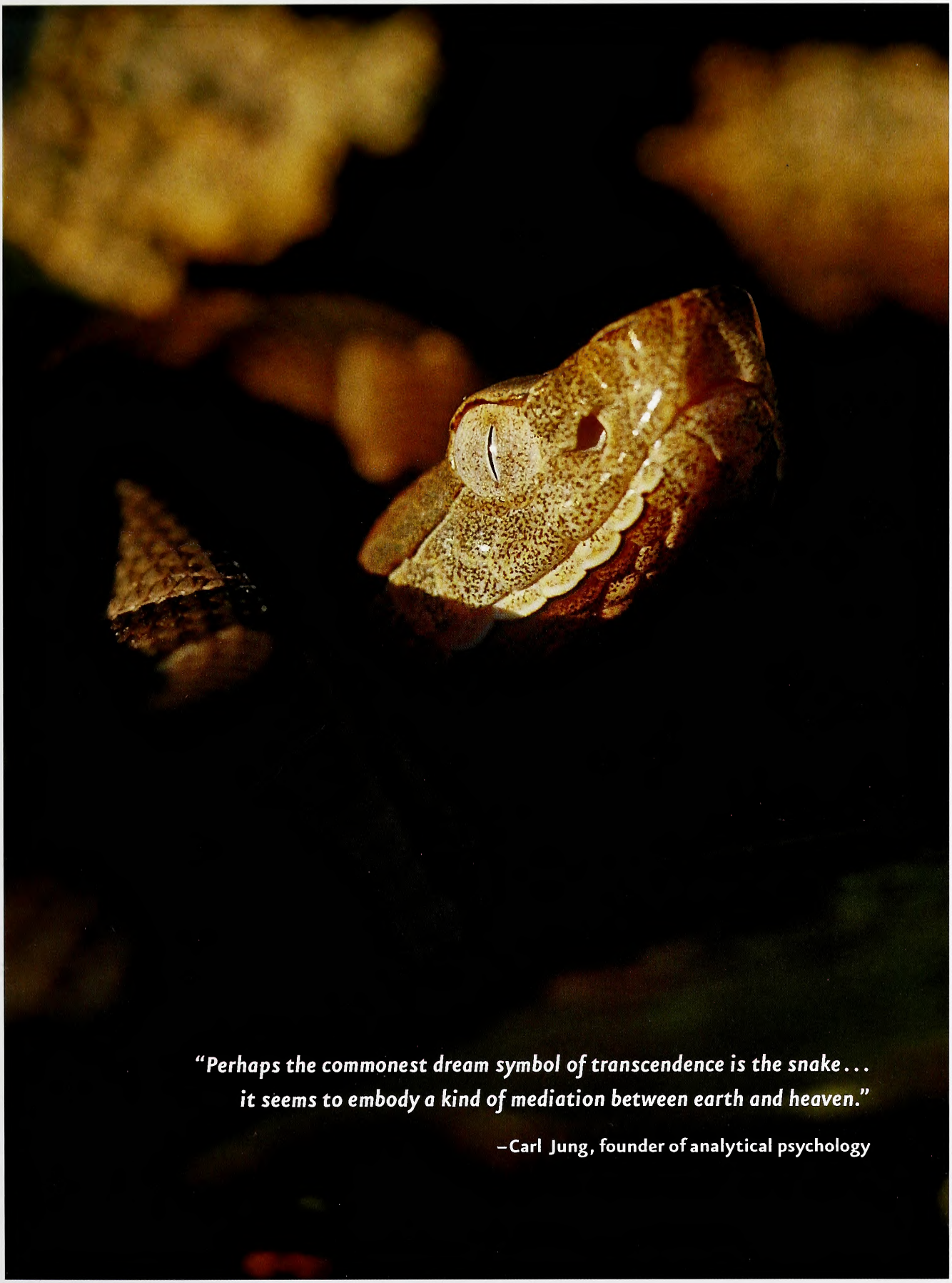
Not only are sunny days likely to prove more productive this time of year, you'll probably have more luck during the warmest hours from noon to mid-afternoon. This is quite different from what you'd expect later in the season when the best fishing usually occurs at dawn or dusk, or on overcast days. If you don't find actively feeding fish in sunny shallows, you might try fishing deeper water slowly and methodically, but don't be surprised if this proves fruitless. In ponds this time of year, feeding fish will usually be shallow, while those in deep water tend to be inactive.

Bass are usually my initial quarry, and I prefer artificial lures ... well, just because. Spinnerbaits, Rat-L-Traps and floating-diving baits like Rapalas are all great choices in early spring. While bass normally aren't hitting lures on top yet, one exception worth trying is a buzzbait. These noisy surface lures can be early season killers. And though soft plastics such as salamanders and worms are normally considered summer lures, they're often effective in early spring, especially wacky-rigged Senko worms (hooked in the middle of the worm).

If the bass aren't cooperating, an ultralight spinning rod with 4-pound test mono may save your day. You should be able to catch plenty of bluegills using small curly-tailed grubs or Beetle-Spins. If there are crappies in the pond, fish the shallows around cover where they will be gathering to spawn, and also look for them suspended in schools in deeper water.

Speaking of spawning, that's another reason you can often expect to find fish in the shallows during early spring. Crappies move in to spawn quite early, even while the water is still chilly in March. And while bluegills and bass won't begin actual spawning until the water temperature climbs into the mid-60s, they're already thinking about it.

Ah yes, the sweet anticipation of getting lucky—it dictates the habits of fish pretty much the same way it does for us.



TODD PUSSER

copperhead

OUTDOOR MOMENT

IN THE APRIL ISSUE

ENGBRETSON UNDERWATER PHOTO

BROOKIE BLITZ

A multiyear, multiagency study reveals where native Southern Appalachian brook trout live and how they are doing.

SWIRLING SANDS

Dunes provide several different habitats that support a much larger number of creatures than perhaps you ever imagined.

THE PERFECT LURE?

Although no one knows exactly why, spinnerbaits catch fish in a greater variety of weather and water conditions than most other lures.

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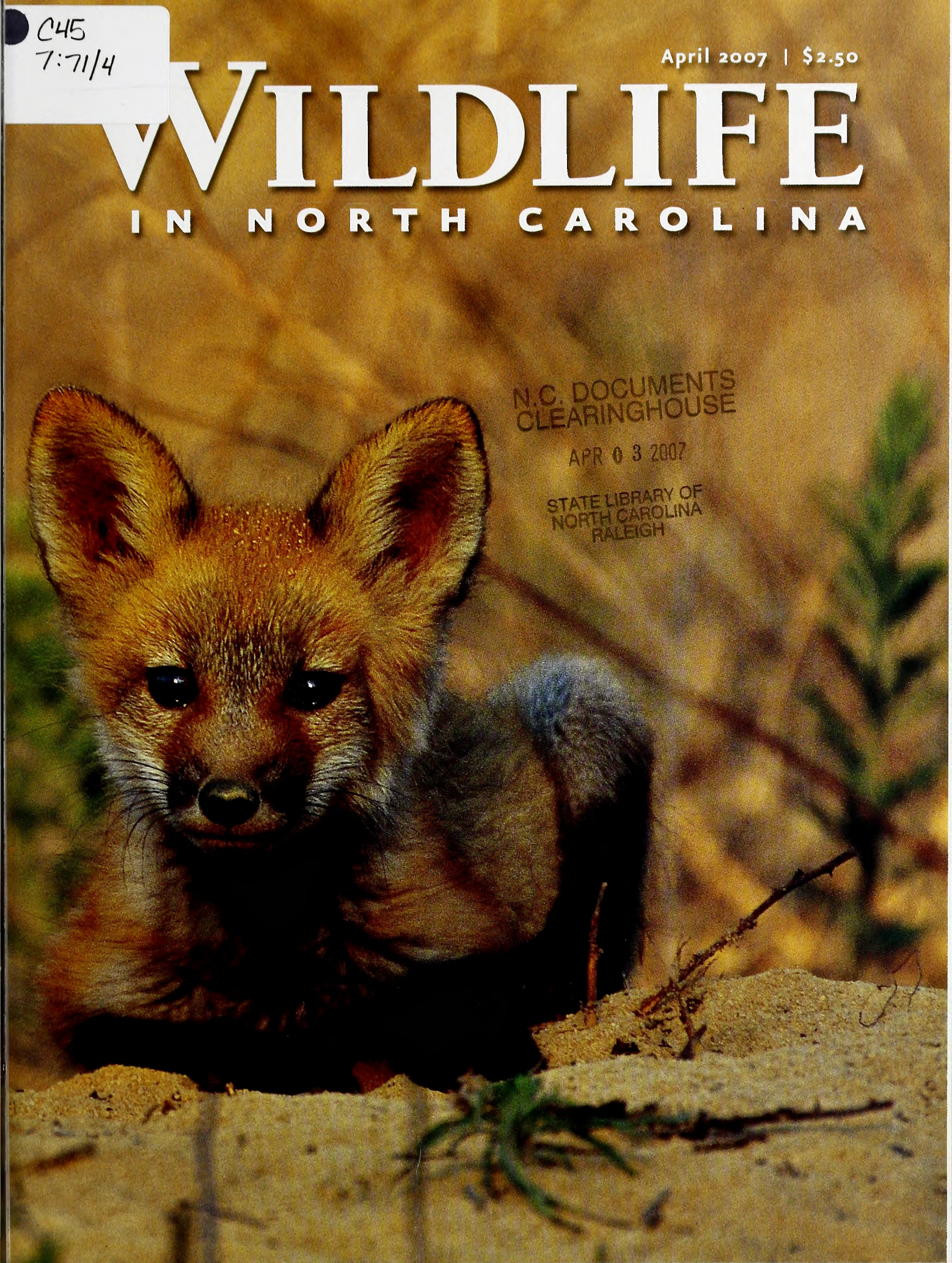

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Sand dunes don't just form interesting patterns, they support a complex web of life. This includes mammals, birds, reptiles, crustaceans, plants, insects and more. **PHOTOGRAPH BY SCOTT TAYLOR.**

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Cover: Creatures such as this red fox kit make sand dunes their home. To see the diversity of creatures living in the sand, you must look closely.
PHOTOGRAPH BY TODD PUSSER.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

Spring is the season when hidden things emerge. Animals wake from hibernation, blossoms burst into view and long-absent warmth draws people outside for the first time since autumn. In the mountains, snow melts to expose ground obscured for months. Garage doors swing wide to loose boats full of eager fishermen onto lakes, rivers and marine waters.

ERIC ENGBRETSON

But not even the life-affirming, almost magical renewal of spring can reveal all. Brook trout are still tucked in tiny pools within mountain streams, showing themselves only when the hatch begins — or when a clever angler fools them into believing that it has. It was fishermen who alerted natural resource managers years ago that they were finding and catching fewer and fewer brookies because of development-related pollution. "Return of the Native?" (page 4) discusses ways the N.C. Wildlife Resources Commission has partnered with many other groups to make sure that the streams in which native brook trout live are restored and protected. That will ensure that even though those colorful fish remain hidden, they are there for future anglers to enjoy.

Herpetologists of some experience know that the vernal equinox does little to bring out the mysterious gopher frog ("The Secret Frog," page 10). This animal lives in burrows within longleaf pine habitat and breeds in ephemeral ponds, two resources that are seriously depleted in North Carolina. Unlike spring peepers or bullfrogs that have distinctive, clearly audible calls, gopher frogs vocalize a low rumble that is often delivered underwater. This combination of severely reduced habitat, a subtle call and a habit of living in holes in the ground can mean that herp hunters might go years between gopher frog sightings.

So, enjoy the dogwoods, butterflies, gobbling turkeys and other signs of spring that are plain to everyone, but remember that some of the most interesting creatures in our state stay hidden year-round. And always know that these animals are just as worthy of protection and study as those that come out to greet us each spring.

Greg Jenkins

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State of North Carolina Office of the Governor

Michael F. Easley
Governor

Dear Fellow Hunter: March 13, 2007

The U.S. Navy's proposal to build an outlying landing field in Washington and Beaufort counties near the Pocosin Lakes National Wildlife Refuge includes a plan that may well eliminate the waterfowl there. This world-renowned refuge for migratory birds serves as the winter home to more than 100,000 ducks, swans, snow geese and countless other waterfowl. If you have ever been to Lake Mattamuskeet or Lake Pungo, you know the value of this resource.

During the past three years, I have had numerous meetings with the Navy at the Pentagon and here in Raleigh. I have repeatedly offered to help the Navy with more suitable locations in North Carolina but they have refused to consider any alternatives. I am more than willing to work with the Navy, but they have not responded in kind.

The Navy used its recently issued Draft Supplemental Environmental Impact Statement to continue its misguided commitment to an outlying landing field site that threatens to ruin this irreplaceable natural resource. In this report, the Navy suggests they have the ability to "manage" this fragile environmental challenge. You can visit the Navy's website at www.efaircraft.ene.com/docs_seis.aspx. They admit they plan to control the waterfowl population by "poisoning, trapping, shooting, employing predatory birds, dogs and limiting their feeding grounds." This is not a plan for management of a prime feeding area for the Atlantic Flyway's waterfowl population. It is clearly a plan that could well destroy the refuge.

I have repeatedly asked our congressional delegation to help with this urgent matter. North Carolina's U.S. Senators Elizabeth Dole and Richard Burr say they do not want to interfere with the military's efforts to find an airfield for pilots to practice aircraft carrier landings. I ask you to contact your senators and congressional delegations. Ask them to withhold funding for this project until the Navy makes a good faith attempt to consider reasonable locations.

Like many of you, I have hunted in the fields, woods and marshes of eastern North Carolina since I was a boy. I know first hand as a sportsman, father and state leader how important it is to be able to share outdoor experiences and make sure they are always available to future generations. I need to enlist you in the battle we are waging to protect one of the most important waterfowl reserves in North America.

I need you to join me in calling and writing your members of Congress who control the purse strings for the Navy's proposal to build an outlying landing field. Tell them the Navy must stop considering the site near the Pocosin Lakes National Wildlife Refuge. We must take a stand and not let this unique refuge be destroyed.

I regret that I find myself at odds with the U.S. Navy, but I assure you I have done everything within my power to find additional, better locations for the outlying landing field. They give me no alternative.

With kindest regards, I remain

Very truly yours,

Michael F. Easley

write us

Letters should be sent via e-mail to **letters@ncwildlife.org** *or through regular mail to Letters, Wildlife in North Carolina magazine, 1712 Mail Service Center, Raleigh, NC 27699-1712. Please include your name, address and daytime phone number. Letters chosen for publication may be edited for clarity and length.*

RICHARD BERNABE

A NEW JOINT VENTURE ASPIRES TO SUSTAIN AND BUILD HEALTHY BROOK TROUT POPULATIONS, INCLUDING OUR OWN SOUTHERN APPALACHIAN STRAIN.

RETURN OF THE NATIVE?

Brook trout, sometimes called specks, are the only trout native to the eastern United States, and can be found from the mountain streams of northern Georgia to the lakes of Maine. Although North Carolina is near the southern edge of the fish's range, our state boasts the largest number of brook trout populations remaining in the southeastern United States. For our purposes, a "population" of brook trout is a group of individuals that are reproductively isolated from other groups.

More than 500 such populations have been documented in western North Carolina. Many of these are the native Southern Appalachian-strain brook trout ("Tar Heel Treasure," July 2004) that have endured in North Carolina since the last ice age more than 10,000 years ago. To date, 133 distinct populations of Southern Appalachian brook trout have been found in all of the 14 major river drainages in western North Carolina. Southern Appalachian brook trout are also native to southern Virginia, Tennessee, Georgia and South Carolina.

This unique resource has been severely affected by human changes to the landscape. Most brook trout populations in North Carolina were lost near the turn of the 20th century as a result of large-scale logging and land-clearing activities. These activities cleared the streams of trees, which warmed the water and introduced sediment that smothered the fragile brook trout eggs.

Also at this time, rainbow trout (from the western United States) and brown trout (from Europe) were introduced to restock the depleted streams. Today, agriculture, wide-scale residential development, commercial logging and road construction continue to have impacts on remaining brook trout populations. As a result, the fish are now found in less than 80 percent of their historic range in North Carolina.

Declining brook trout populations are not unique to North Carolina. Similar declines have been experienced in every state throughout the fish's eastern range. Agencies responsible for the protection of brook trout, including the N.C. Wildlife Resources Commission, realize that the disturbances from human activities likely will lead to further losses, unless significant conservation actions are undertaken on a range-wide scale.

Written by Doug Besler

In June 2004, representatives from more than 50 state and federal fish and wildlife management agencies, nongovernmental organizations and academia met to discuss the opportunity for a cooperative approach to the conservation of brook trout in the eastern United States. It was the group's consensus that there was an opportunity to form the Eastern Brook Trout Joint Venture (EBTJV, www.easternbrooktrout.org) as a pilot project under the National Fish Habitat Action Plan (www.fishhabitat.org).

An Eastern Partnership

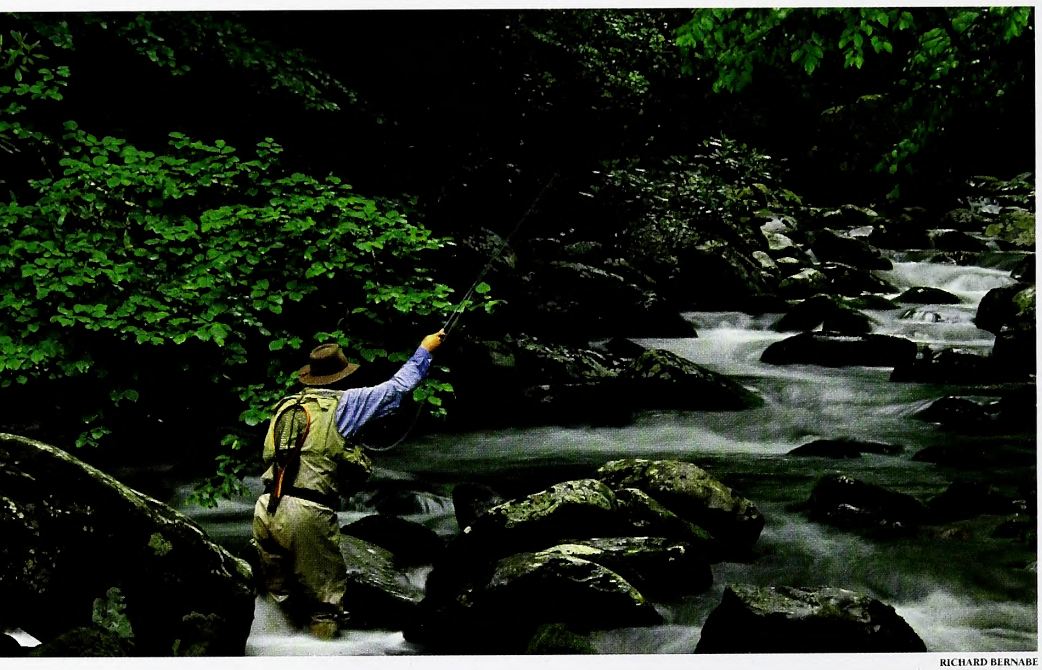
The goal of the EBTJV is to sustain healthy populations of brook trout that are capable of supporting angling. This partnership approach is justified because, as stated before, brook trout are declining across the eastern United States, and reasons for the declines are similar throughout the range. Populations of brook trout in many cases span state borders; as a result, various state and federal agencies have management responsibility for their well-being. It is our hope that this partnership approach will produce positive changes for brook trout that groups or agencies could not accomplish individually.

The first step in this partnership was to determine the status of brook trout populations across their eastern range, a task which had never before been attempted. This assessment systematically looked at the status and threats facing brook trout on a watershed-by-watershed and state-by-state basis. After 5,563 watersheds were examined, the assessment dramatically showed how many populations have been lost across their entire range.

Approximately 95 percent of the watersheds where brook trout historically thrived have been affected by humans to the extent that populations are now moderately or severely reduced. Most of the pristine brook trout habitat left in the eastern United States is located in the vast wilderness of Maine. In North Carolina, like most of the eastern United States, brook trout are now found only in small headwater streams where undisturbed forested habitat remains.

The EBTJV assessment also examined reasons for the decline of brook trout and found that the number one threat was poor land management associated with agriculture.

The Southern Appalachian-strain brook trout is North Carolina's only native trout and is typically found only in small headwater streams.



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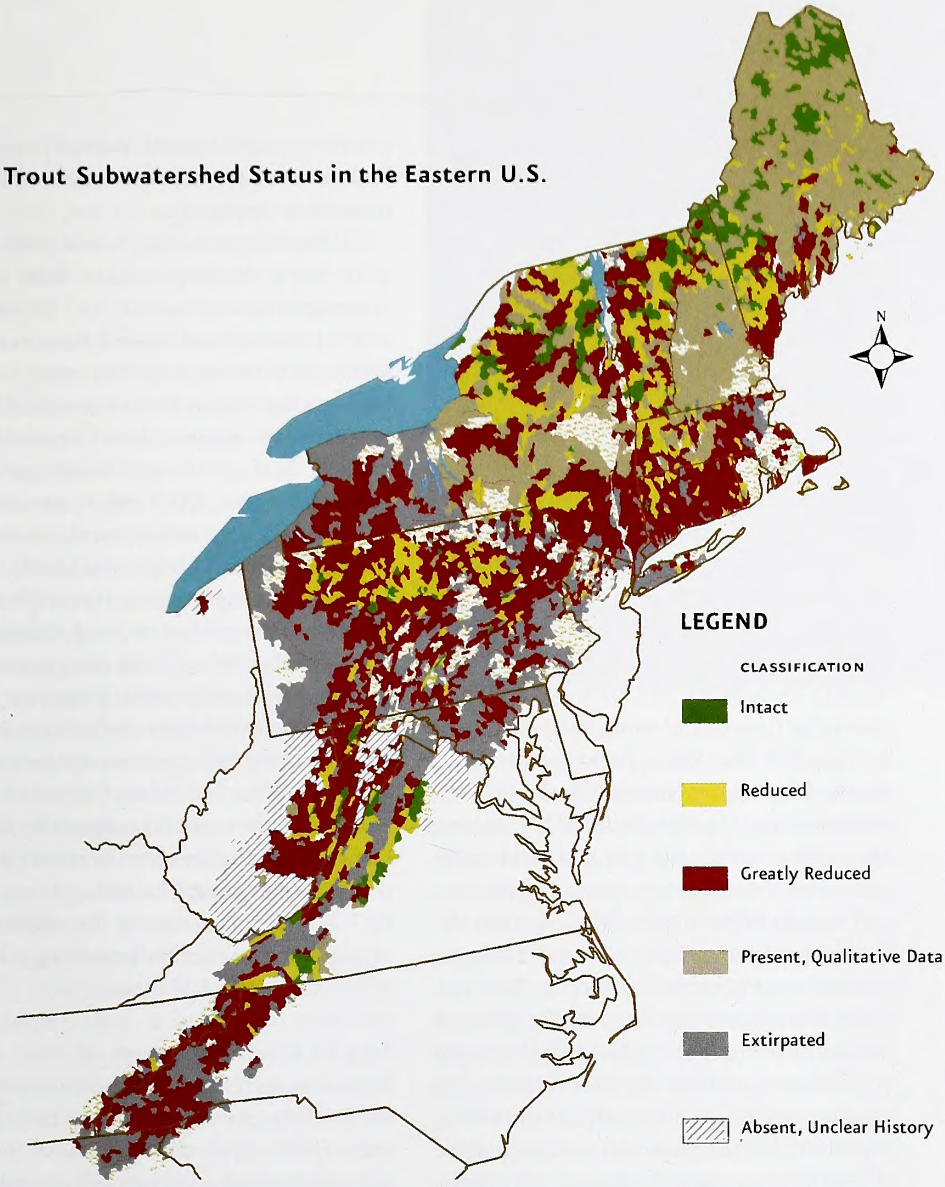
Brook Trout Subwatershed Status in the Eastern U.S.



LEGEND

CLASSIFICATION	DESCRIPTION	PERCENTAGE
Intact	90–100% historical habitat occupied by self-reproducing brook trout	5%
Reduced	50–90% historical habitat occupied by self-reproducing brook trout	9%
Greatly Reduced	1–50% historical habitat occupied by self-reproducing brook trout	27%
Present, Qualitative Data	Present, but no quantitative data available on populations	19%
Extirpated	Brook trout have vanished from this subwatershed	21%
Absent, Unclear History	No brook trout currently present, historical presence unknown	6%
Unknown, No Data	No quantitative or qualitative data exists	13%
Lakes		

MAP BY KRISTIE RHODES
Source: Nathaniel Gillespie, Trout Unlimited

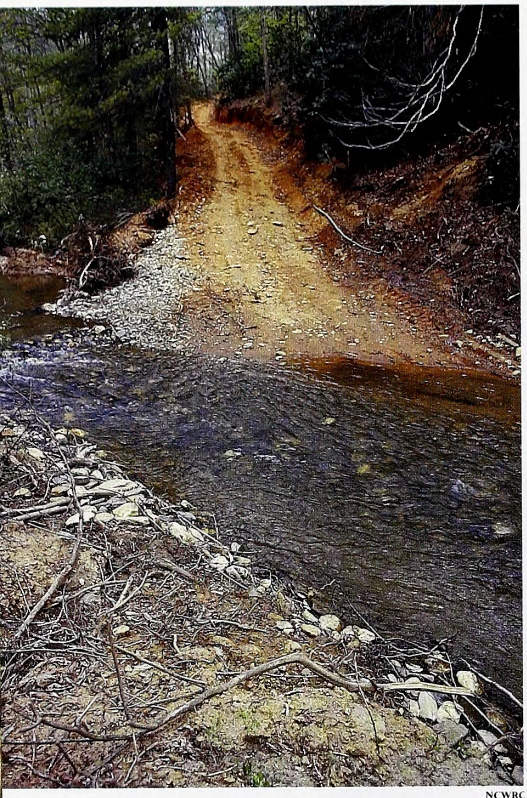
Practices such as clearing riparian areas of trees or allowing livestock unrestricted access to streams destabilize the stream bank, increase erosion and introduce sediment into the stream. In addition, introductions of non-native fish such as rainbow trout, which were stocked in large numbers in the southeastern United States beginning in the late 1800s, or smallmouth bass, which currently are being spread into brook trout lakes and rivers in the northeastern United States, were ranked as the top biological threat.

In North Carolina, commission biologists examined historic trout sampling records and current distribution data and concluded that brook trout no longer occur in 36 percent of the watersheds they formally occupied and are severely reduced (by more than 50 percent) in most of the watersheds they currently inhabit. The majority of brook trout populations in North Carolina are now found in the Pisgah and Nantahala national forests and the Great Smoky Mountains National Park. Populations on these publicly owned lands are relatively stable because of their locations in protected forested watersheds. However, even these populations face environmental threats from acid rain, global climate change and competition from rainbow trout and brown trout that now occupy most of the brook trout's former range.

The Private Lands Problem

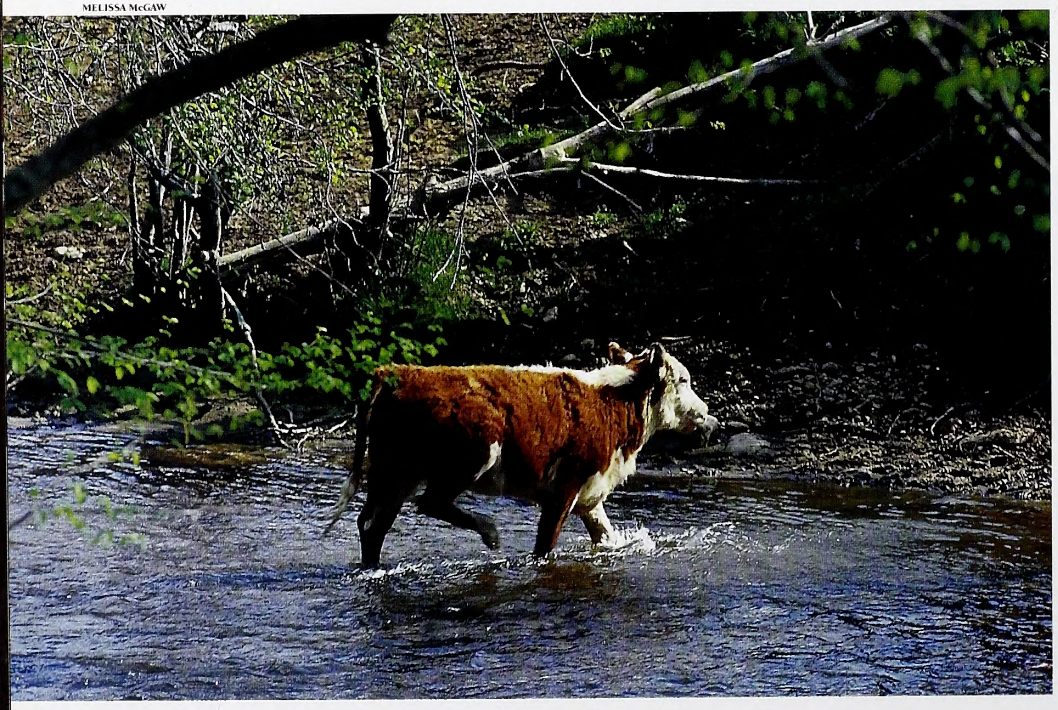
The distribution and status of brook trout on private lands in North Carolina remain largely unknown. Populations on private lands face additional threats from agriculture, commercial logging, road construction and extensive residential development. Unfortunately, a significant number of these populations are being lost every year. Before we can begin to protect, enhance or restore brook trout in North Carolina, we must know their current distribution. It has been estimated that there are approximately 150 additional populations of brook trout located on private lands in North Carolina that have never been documented or genetically identified. It is our goal to complete this assessment and genetic work in the next five years. Landowners can assist the commission with this project by allowing

Poor land management practices associated with agriculture, such as letting cattle wander into streams, are the top threats to brook trout populations.



NCWRC

MELISSA McGAW



biologists access to property so surveys can be completed.

Following the status assessment, the next task undertaken by the EBTJV was the development of range-wide, regional and statewide brook trout conservation strategies, which are designed to stem loss and facilitate recovery of the species. Range-wide strategies were developed for threats that are common among all states, such as acid rain or impacts from agriculture. Regional strategies are focused on issues that are important to unique ecological areas, such as acid mine drainage in the coal-producing region of the mid-Atlantic. Statewide strategies focus on threats and solutions that are locally important.

To that end, a brook trout conservation strategy for North Carolina was developed jointly by the commission, the U.S. Forest Service, the Blue Ridge Parkway, the Great Smoky Mountains National Park, Trout Unlimited and the Federation of Fly Fishers. This conservation plan lists goals and strategies deemed necessary to protect, enhance and restore populations of brook trout in North Carolina. Our state's conservation strategies are centered on six priorities: 1) brook trout population assessment; 2) stream habitat protection; 3) restoring brook trout populations and their habitat; 4) protecting brook trout genetic diversity; 5) providing educational outreach; and 6) creating recreational fishing opportunities. Several of these priorities—assessment, habitat protection and protecting genetic diversity—are of immediate importance.

Ultimately, protecting brook trout habitat is the key to the perpetuation of the species. State agencies, such as the N.C. Department of Environment and Natural Resources, have authority to enforce current environmental laws and regulations that are designed to minimize human impact on brook trout and their habitats. Most environmental laws and regulations, however, apply only to specific areas (a large residential development) or situations (discharge from an industrial plant).

Sediment in streams is the single largest threat to water quality in North Carolina and is usually the reason brook trout populations are lost. Large-scale habitat protection, which stabilizes stream banks and reduces erosion, is significantly lacking on private land in most areas where brook trout are found. It is widely accepted in the scientific community that vegetated stream buffers are the most effective way to protect stream habitat and water quality. It is our goal to promote the establishment of vegetated stream buffers along all trout streams in North Carolina.

Cattle and Trout

Many low-tech solutions exist that can dramatically improve brook trout habitat and water quality. For example, one of the most effective strategies is to fence livestock from streams and allow the riparian areas to revegetate with trees. The National Resource Conservation Service offers federal cost-share programs to assist landowners with livestock fencing projects that protect stream habitat and still provide livestock access to water (www.nrcs.usda.gov). Landowner support for environmental regulations, particularly in western North Carolina, can be difficult to obtain; therefore, support from the population at large, municipalities and legislators is critical. Part of the EBTJV goal is to establish and foster relationships with groups such as landowners, developers and municipal governments, which typically are not engaged with management agencies.

One way environmentally minded landowners can become involved in the EBTJV is by formally protecting brook trout streams or watersheds. A goal of the EBTJV is to educate and inform landowners about programs and opportunities available to them. Some o

these opportunities include conservation easements, access easements, state and federal conservation protection programs, and donating or selling land to conservation land trusts. Many of these programs offer financial or tax incentives to landowners. In addition, new programs must be initiated that take into account protecting brook trout habitat with the realization that development in the mountains of western North Carolina will continue.

One successful example is a large residential community (over 6,000 acres) that is currently being developed with a significant amount of the property (about 30 percent) in a conservation easement. Although the amount of property in the conservation easement is large, this developer realizes that the key to this "green" development is marketing the protection of the wild trout streams on the property. By working cooperatively with private consultants and the commission, the developer has agreed to allow limited public angler access to several miles of trout streams in the development, including two brook trout streams.

This type of development provides angler access to trout streams that would normally be available only to development property owners, provides the developer multiple marketing benefits and keeps the commission actively engaged in the management of the resource. As development in the mountains of western North Carolina is likely to increase, "green" developments represent an opportunity for successful partnerships between developers and resource protection agencies.

Southern Appalachian brook trout have become increasingly important since they were first recognized as the native brook trout strain in North Carolina in the 1990s. It is a goal of the EBTJV to conserve the genetic diversity of the remaining Southern Appalachian brook trout populations in North Carolina. The commission has stocked millions of rainbow, brown and brook trout (northern strain) in North Carolina streams since the 1940s and has no doubt contributed unintentionally to the decline of Southern Appalachian brook trout. New technologies, however, allow agencies the opportunity to continue to provide stocked trout fisheries for angler enjoyment while protecting wild populations of brook trout.

The commission is currently conducting research examining the feasibility of producing sterile trout that would be stocked in all Hatchery Supported and Delayed Harvest streams (approximately 750,000 trout per year). This would allow the commission to continue the long-standing tradition of providing stocked trout fisheries; however, this change would eliminate the chance that any stocked trout could reproduce in streams that contain Southern Appalachian brook trout. In addition, the commission now requires individuals to have permits to stock any public waters of North Carolina (www.ncwildlife.org). This permit process will help ensure that the public will not unintentionally introduce non-native trout into brook trout streams. Landowners should consider stocking private ponds with sterile trout, which are now commercially available, to minimize impacts if those trout escape into nearby streams.

The human population in the eastern United States is likely to increase substantially in the next 50 years, and we can expect more disturbances to the landscape that will negatively affect brook trout populations. The future and success of the EBTJV are critically linked to the support it will receive from anglers, the public, municipalities and state and federal legislators. Whether you want to fish for Southern Appalachian brook trout, believe in the preservation of this unique species or demand clean water, brook trout should be important to you. ◆

Doug Besler is the coldwater research coordinator for the N.C. Wildlife Resources Commission's Division of Inland Fisheries.

ERIC ENGBRETSON

Brook trout have inhabited North Carolina mountain streams since the last ice age more than 10,000 years ago.

ULTIMATELY, PROTECTING BROOK TROUT HABITAT IS THE KEY TO THE PERPETUATION OF THE SPECIES. STATE AGENCIES, SUCH AS THE N.C. DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, HAVE AUTHORITY TO ENFORCE CURRENT ENVIRONMENTAL LAWS AND REGULATIONS THAT ARE DESIGNED TO MINIMIZE HUMAN IMPACT ON BROOK TROUT AND THEIR HABITATS.

THE

SOMETIMES THE CREATURES THAT ARE THE HARDEST TO GET TO KNOW CAN BE THE ONES WITH THE MOST TO TEACH US.

FROG

WRITTEN BY JEFF BEANE . PHOTOGRAPHED BY TODD PUSSER

Frogs enjoy a measure of popularity among humans. By day, their sudden leaps and splashes add vitality to waterways and wetlands. By night, their voices make the dark a friendlier, more familiar place. They are effective insect control agents. Their faces and body shapes suggest our own, making them personable to us—at least more so than many other "cold-blooded" creatures. The bullfrog booming from the farm pond; the spring peeper piping shrill assurance of yet another spring from the swampy creek bottom; the sleek leopard frog flaunting dapper spots in the meadow; the somber toad inhaling cutworms in the garden—these are frequent targets of endearment, for they wear their hearts on their sleeves.

But the frog perhaps dearest to me is one that few North Carolinians have heard of, let alone seen. It survives in a few patches of habitat that we've not yet destroyed, shunning sunlight and creeping from its hole like a ghost from a bygone era, to sing (be you sufficiently imaginative to call it that) in only a few fish-free ponds on only a few winter or early spring nights of only certain years. Its life is a dark secret, acknowledged by only a few fringe element types.

The gopher frog (*Rana capito*) takes its common name from the gopher tortoise, whose burrows it inhabits in the Deep South. Three races or subspecies are recognized—the Florida gopher frog (*R.c. aesopus*) of peninsular Florida and southern Georgia; the dusky gopher frog (*R.c. sevosa*) of the Gulf Coast, and the Carolina gopher frog (*R.c. capito*), ranging from south-central Georgia to southeastern North Carolina. For years they were lumped with the closely related crawfish frogs (*R. areolata*) of the Midwest, before their morphology, behavior and genetics were sufficiently understood for them to be recognized as a separate species.

Atypical members of the family Ranidae (the "true frogs"), gopher frogs superficially resemble toads, with their chunky bodies, terrestrial habits and warty skins—a Carolina gopher frog's symmetrically arranged warts lend it a "cobblestone" texture. Adults enter water only to breed, spending the rest of their lives down burrows in sandy uplands. Since gopher tortoises don't occur in North Carolina, the frogs here use other refugia—probably stump holes or mammal or crayfish burrows—though no one knows for certain because adults are rarely encountered outside the breeding season. "What we know about the gopher's biology in N.C. wouldn't tax the mental capacity of a slug," wrote Dave Stephan in a 1982 article for the North Carolina Herpetological Society newsletter. A quarter-century later, we still needn't worry overly about straining any gastropod brains.

"GOPHER FROGS ARE HIT BY A DOUBLE WHAMMY," SAID ALVIN BRASWELL OF THE N.C. MUSEUM OF NATURAL SCIENCES, WHO HAS MONITORED THE FROG'S STATUS IN NORTH CAROLINA FOR MANY YEARS. "THEIR BREEDING PONDS AND THEIR TERRESTRIAL HABITAT HAVE BOTH BEEN VIRTUALLY WIPED OUT."

What we do know is that gophers are specialists, requiring ephemeral ponds—ones that dry up periodically—for breeding, and longleaf pine savannas for terrestrial habitat. Like most specialists, including many associated with the longleaf ecosystem (see "My Longleaf," Sept. 2006), they are struggling in a rapidly changing world. "Gopher frogs are hit by a double whammy," said Alvin Braswell of the N.C. Museum of Natural Sciences, who has monitored the frog's status in North Carolina for many years. "Their breeding ponds and their terrestrial habitat have both been virtually wiped out." Indeed, the species has become uncommon to rare throughout its range and is a candidate for federal listing. In North Carolina, it is state-listed as threatened.

A gopher frog's voice is a low, rumbling snore that to human ears sounds more like gastrointestinal disturbance than a love song. Sometimes delivered underwater, it would not be called a pretty sound by many, but it is one of my favorites in all of nature because of what it represents. Breeding usually occurs between mid-February and mid-April but is dependent on weather. Females deposit a large, globular egg mass, usually attached to a stem several inches below the water's surface, often in water a foot or more deep. The egg mass may absorb water until it is larger than a softball. Hatching occurs in a few days, and the tadpoles normally take three to four months to transform, depending on water temperature and food resources.

In a few sites along the coast, there has been evidence of autumn breeding (usually following hurricane weather) and larvae overwintering. The tadpoles are strikingly similar to those of the Southern leopard frog—a species which usually shares the gopher's habitat. Even experts have difficulty distinguishing them—another reason why gopher frogs often escape detection. Tadpoles typically transform around late May or June. Juveniles usually pick a rainy night to leave the ponds and begin their terrestrial existence. Adult frogs in Florida have been known to inhabit burrows over a mile from their breeding ponds.

A captive gopher frog, raised from an egg, lived for more than nine years at the N.C. Museum of Natural Sciences. Otherwise, little is known of the species' potential longevity, but ephemeral pond breeders are often relatively long-lived. They have to be to survive droughts potentially lasting several years.

Gopher frogs are apparently indiscriminate feeders, their large heads and mouths enabling them to take sizable prey items (the species name *capito* references the large head). Captives have accepted a variety of insects, isopods, earthworms and small mice, but little is known of their natural diet. Ground beetles have been present in one or two stomachs I've examined.

Specific predators of North Carolina gopher frogs have not been recorded. Eggs and tadpoles are probably eaten by aquatic insects, newts and other predators. Adults are presumably unpalatable to many animals, but the skin toxins are poorly known. A gopher frog, when handled, usually puts its "hands" on its head as if to hide its eyes or to say, "I surrender." It is our only ranid frog to exhibit this behavior, which is similar to the "unken" reflex of newts, and typical of highly toxic amphibians. Nonetheless, I have found adults eviscerated and skinned—possibly by raccoons, which are known to eat the internal organs of some other noxious-skinned amphibians.

Gopher frogs were not discovered in North Carolina until 1933, when B.B. Brandt reported them in Beaufort County, where they apparently no longer occur. Known historically from 13 North Carolina counties, the species now survives primarily in areas such as Fort Bragg, Sandhills and Holly Shelter game lands, Camp Lejeune, Military Ocean Terminal at Sunny Point and Croatan National Forest—places with reasonably large tracts of longleaf pine and a few suitable breeding ponds.

"I'm really concerned about the gopher frog," Braswell said. "It continues to lose ground and isn't gaining any." But these days, ground is hard to gain. Besides habitat loss and fragmentation due to development, agriculture and other human land-use practices, fire suppression may be causing breeding ponds to acidify, or to dry up due to plant succession. Construction of wells for house trailers and subdivisions lowers water tables, causing further drying of breeding sites. I've seen former breeding ponds in New Hanover County churned into barren mud holes by off-road recreational vehicles. Ozone depletion, acid precipitation, pesticides, fertilizers, chytrid fungus and introduced predators such as fire ants may also contribute.

Many amphibians sharing the gopher's breeding requirements—among them Mabee's and tiger salamanders (see "Bashful Tiger," Dec. 2004), ornate chorus frogs, oak toads and barking treefrogs—face the same fate. But gopher frogs seem to need deeper ephemeral ponds and more pristine terrestrial habitat than even most of these creatures. Among the few checks in the positive column are the fact that some quality habitat is fairly well protected, and that artificial breeding habitat can be created—the frogs will use borrow pits and other man-made sites. But building a high-quality ephemeral depression is not always easy; most efforts so far have resulted in ponds that hold too much water or too little.

One artificial site that has functioned well is a large borrow pit in Scotland County, originally dug by the N.C. Department of Transportation for solid fill several decades ago. I thought I knew gopher frogs until I stood hip-deep in that pit in the wee hours of March 1, 1995, with four friends, none of

whom had ever seen gopher frogs before. It had been nine years since the species had been observed using that site, and the population was feared extirpated. But it wasn't—at least eight adults returned to the pit to breed. I held a gopher frog aloft in one hand and a tiger salamander in the other—something I imagined very few people had ever done. It was then that I felt a curious transfusion of power. It was a power these animals had but I did not—their power to persevere, to teach me things, to show me how to live in a world without ruining it. Their power to carry out their secret mission year after year, for as long as they could, until they disappeared forever, to be part of the world, until they couldn't be part of it anymore: This was the gopher frog's secret.

But though I might have counted myself immeasurably fortunate to stand in a cold, flooded sandpit amid muffled snores, the fact remained that the rest of my species was obsessed with power of a different sort. To the great majority, a virtually invisible frog in a real, ancient, marvelously functional system was infinitely less important than the comfort, convenience and cash flow of a newly created, perilously flawed, artificial one. The new system made no allowances for a species to be appreciated simply for what it was, or to exist solely for its own sake. Nothing lasts forever, but did Carolina gopher frogs have to become memories during my lifetime?

If so, they'd be treasured ones. Because I remember the little bubbles that rise when a gopher frog growls underwater. I remember seeing—one Valentine's Day—a "love triangle" of two males amplexing a single female. I remember the new populations of the species that I discovered, or helped discover. I remember sneaking, like a spy behind enemy lines, into a military impact area at night in order to document the species in a new county. I remember visually counting

Top: This juvenile lacks the size and heft of an adult but otherwise looks similar. Bottom: The Florida gopher frog, a separate subspecies from the Carolina gopher, generally is colored lighter.

Gopher frog breeding occurs in ephemeral ponds and flooded sand pits such as (from left) Duke Ponds in Scotland County, Goosepond Bay in Robeson County and 17 Frog Pond, where author Jeff Beane searches for the elusive creature. Below: 17 Frog Pond is the state's largest known breeding site.

21 adults — besides hearing many others calling — in a pond one night after El Niño. I remember Robeson County deputies spotlighting me out of a Carolina bay late one night — first reaching for their weapons, then laughing with relief when I told them I was hunting a rare frog and not the body of the murder victim they sought. I remember Florida gopher frogs down tortoise burrows, and the big female — found belly-up in the road, bleeding from the mouth — that I nursed back to health and released seven months later. I remember all the people to whom I introduced these remarkable amphibians for the first time.

One night, nearly a decade ago now, it was *Wildlife in North Carolina* photographer Melissa McGaw's turn to meet the gopher frog, and we stood in perhaps the best remaining breeding site in the state, amid a chorus so loud that it drowned out the ear-splitting spring peepers. We saw many egg masses, newly hatched larvae and adults,, including an egg-laden female that had been gutted by an unknown predator. We met a late arrival to the festivities, on a beeline course for the pond. Coincidentally or not, he'd chosen the path of least resistance — the same firebreak we'd come in on. I wondered how far he'd come. While Missy tried for photos, I killed my flashlight and immersed myself in the sound of the breeding chorus and the feel, smell and other sensations of the pond and night air, trying hard to imagine what it would be like to be a gopher frog. I could never know, but that was as close as I would come.

I'll have these memories until they're taken by death or Alzheimer's. But they won't be enough. For people who have known, or tried to know, the gopher frog, relegating it to the realm of memory just won't be enough. ◆

Jeff Beane is a herpetologist with the N.C. Museum of Natural Sciences.

NATURE'S WAYS

Is it better to be a generalist or a specialist?
See Nature's Ways, page 39.

Spinnerbaits can be a deadly lure for large-mouth bass in just about any water or light conditions at any time of the year.

A Lure for All Seasons

THIS WEIRD-LOOKING ASSEMBLAGE OF WIRE AND LEAD AND SILICONE JUST MIGHT BE THE BEST LURE YOU CAN PUT IN YOUR TACKLE BOX.

written by Dan Kibler • photographed by Soc Clay

If you were to peek into the tackle box of any weekend bass fisherman, almost every lure tucked away in the little drawers, the compartments, the nooks and crannies would look like something a fish might actually eat.

That rubber-skirted jig with the plastic or pork-rind trailer? It's not much of a reach to see a crawfish—perhaps the favorite food for almost all bass. A plastic lizard or crawfish? Self explanatory. A plastic worm? Sure, a night crawler, sand eel or small snake. A tube or Gitzit? Another imitation crawfish. And how about those long, slender plugs? Minnows. Those short, fat plugs? Bream. Jigging spoons? More silvery minnows.

So far, so good. But then, you reach into one section of the box and draw out a colorful, jangling assortment of wires and thin, funny-shaped pieces of shiny metal, all sticking out of a chunk of lead dressed with long strands of silicone.

What possible fish food is a spinnerbait supposed to look like? It's hard to tell what a fish sees when a spinnerbait comes rolling past, its blades whirling and its skirt pulsating. Is it a baitfish? A frog? A duckling? Who knows?

From a fisherman's point of view, it's easy to see why any angler would get hooked on a spinnerbait. Rarely has there been a lure that's so productive in all seasons and under so many different conditions. It catches fish in winter, spring, summer or fall, in clear water, stained water, muddy water, high water or low water. It catches the three major species of black bass: largemouths, smallmouths and spotted bass.

If there is one lure a fisherman can't do without, this might be it.

Muddy water? Outfit the basic spinnerbait with blades that will churn up a fuss going through the water, producing vibrations that will set a bass' lateral line jumping.

Windy conditions? Outfit the bait with blades that will produce a lot of flash when beams of sunlight bouncing around due to wave action reflect off their surfaces.

Deep water? Go with a heavier bait—they're made in weights of up to 2½ ounces. Cast it out, let it sink to the bottom and just crawl it across the bottom, reeling just hard enough to make the blades turn.

Clear water? Go with a smaller bait and smaller blades. Consider blades that are painted instead of the normal shiny metal colors.

If anyone in North Carolina understands what makes a spinnerbait tick—if "tick" is the correct word—Bill Morgan and Chris Elliott do.

Calling the Hawgs

For 21 years, from a workbench in the basement of his home in Winston-Salem, Morgan and a handful of second-shift co-workers from R. J. Reynolds Tobacco Company made

spinnerbaits—more than a million that bore the name Hawg Caller on their blades and on the green blister packs that hung on the walls of tackle shops across the Southeast.

And Elliott has profited greatly from his knowledge of spinnerbaits and what makes them tick. A pro bass fisherman who also works a saltwater guiding business from his home in Beaufort, Elliott has made hundreds of thousands of dollars in tournaments across the country because he knows a spinnerbait's capabilities and how to get the most out of it.

Some of the best bass fishermen in the country have carried Morgan's Hawg Caller baits in their tackle boxes. Well over $1 million in prize money has been carried home in the wallets of fishermen using the spinnerbaits that Morgan built, piece by piece, pouring lead for the heads and painting them; bending the wires; adding blades of various shapes, sizes and colors; then dressing them with rubber or silicone skirts.

Morgan wasn't in it for the money—although he did sell the company for a pretty penny after he retired from his regular job several years ago. He got started because he wasn't satisfied with the spinnerbaits he was buying in stores.

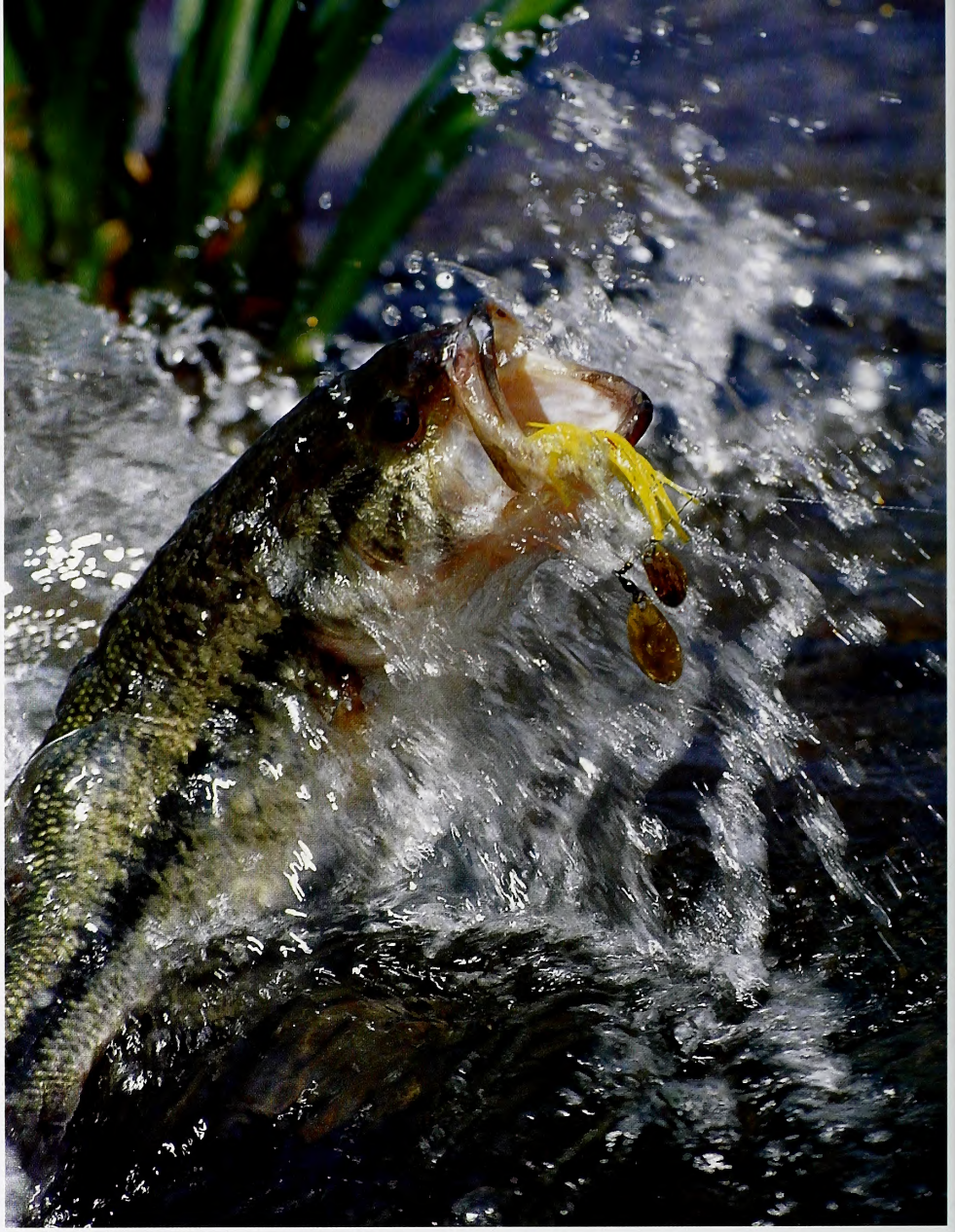
"My friend Bill Beshears and I were fishing together a lot, and we'd find a spinnerbait combination that worked, then we'd go back to the tackle shop and we couldn't find it," Morgan said. "That's when we started monkeying around and making them so we'd always have what we needed."

"Monkeying around" led to conversations with tackle shop owners up and down the Yadkin River—those serving Badin, Tuckertown and High Rock lakes—and that led to the decision to make enough lures to sell. Within a half-dozen years, Morgan was connected with some of the best bass fishermen in North Carolina and South Carolina, learning as much about spinnerbaits as he was teaching.

And the first thing he learned is that a spinnerbait doesn't necessarily draw strikes from bass because it looks like something on a fishy dinner menu. In fact, when bass are in situations where they can get a good look at a passing spinnerbait, they rarely bite.

"It's a reaction bite; that's the bottom line," Morgan said. "The flash from the blade looks like a minnow darting away, or he'll feel the vibration of the blades coming through the water. He's just striking out at something because he doesn't want it to get away."

A big bass might be territorial and not want something foreign swimming past its stump or laydown tree. The thumping blades might put a vibration in the water that the bass detects, so he strikes just to scratch the itch the bait has created.



Veteran bass anglers believe that a spinnerbait will provoke a "reaction" strike from largemouths.

An itch for fish

Creating an itch is what a spinnerbait does. Elliott explained that there are any number of ways to do just that—changing the size and weight of the bait and the size, shape, color or type of blade—depending on the conditions a fisherman faces.

"Any game fish from a wahoo to a crappie will hit a fleeing baitfish, and that's what a spinnerbait's blades look like to a bass, and he'll take a swipe at it," said Elliott, who once clinched a $100,000 first prize in a tournament by catching a 7-pound, 6-ounce largemouth bass on a spinnerbait. "A spinnerbait doesn't really imitate anything until the blades start turning.

"If fish are feeding primarily on bream or shiners, you fish one blade. In muddy water, you fish another. Blade selection is the whole key. Playing with the kinds of blades and the sizes, knowing when to change and what to use under different conditions, that's what separates guys who are good spinnerbait fishermen from guys who are just out there slinging them."

Most spinnerbaits come with a combination of one or two of three different styles of blades: Colorado, Indiana or willow leaf. The Colorado is the closest to round; Indiana blades are teardrop shaped; and willow-leaf blades are elongated blades shaped like, well, the leaves of willow trees.

Spinnerbait Smorgasbord

Colorado blades often are called "thumpers," because they produce the greatest amount of vibration.

A spinnerbait outfitted with hammered gold and nickel Colorado blades will produce more flash and vibration.

The pairing of a willow-leaf blade and Indiana blade is a classic combination that is effective in many situations.

LURES COURTESY OF BOOYAH BAITS/LURENET

Colorado blades are often referred to as thumpers because they produce the greatest amount of vibration. Indiana and willow-leaf blades produce vibrations that are progressively higher pitched.

Blades come in gold or nickel colors, as well as painted white, chartreuse or orange, and they can have smooth or hammered finishes. You just match the bait to the conditions—whether they include stained to muddy water, wind or moving water.

"A tandem spinnerbait with a small willow-leaf blade and a small Colorado blade is the old standby that will work under just about any condition," Elliott said. "If you want to get more specific—if you need more flash—you would go to maybe two willow-leaf blades, and if the water's muddy, you'd want to fish a big Colorado blade, either a single spin or double spin. When the water is dirty, fish feed more by feel than by sight."

"In dirty water, you want vibration," Morgan said. "A spinnerbait will absolutely work in dirty water, and the dirtier the water, the bigger a blade you would want to use. If you were fishing a windy point, you'd want a bait that would give off more flash. And in clear water, you'd want to use a colored blade—a white blade—and you'd want to downsize your bait.

"A hammered gold blade puts off the most flash. You want to use a hammered nickel blade when the wind is blowing, and a plain nickel blade when it isn't blowing. There's no doubt that building your bait out of a light wire is the whole key. You get the most vibration out of light wire; you need as small a wire as you can use without it being so small that it tears up all the time."

The wire is twisted through the eye of a hook, which is inserted into a mold; then lead is poured in to shape the head, which gets several coats of paint and is detailed with an eye. An inch or so from the head, the wire is twisted again to form the line tie, and then blades are added. The front blade—and most combinations carry more than one—is attached by a clevis, a tiny, half-moon-shaped piece of metal that slips on the wire. Several gold beads go on the wire, then the wire is bent into a circle to hold one end of a specially designed swivel, and the second blade is attached to the swivel. Finally, a rubber or silicone skirt is threaded over the point of the hook and onto the bottom of the lead head, and the spinnerbait is ready to go bother a bass.

Making it better

Some fishermen make a few alterations to suit the way they fish or certain conditions. Adding a second skirt is common, but even more common is adding some kind of plastic or pork trailer to make the bait appear larger or give it more bulk to slow its fall. Almost as popular is the addition of a trailer hook, which has an extra-large eye that is slipped over the barb of the spinnerbait hook and rides in the bend, often held in place by a sliver of surgical rubber tubing. That gives the bait twice the number of hooks, a distinct advantage in case a bass slashes at a bait and "short strikes" it, hitting only the tail end.

Not many fishermen use spinnerbaits in anything but shallow water. Elliott admits that most of the time he's fishing a spinnerbait, he's in 6 feet of water or less. But he said that "it's a bait that you can actually fish anywhere from 1 to 50 feet deep if you want to.

"You see people slow-rolling a spinnerbait in cold-water conditions in 8 to 10 to 20 feet deep, and you go to a lake like Guntersville (Alabama) or even Shearon Harris, a lake with grass, and you'll see people fishing spinnerbaits a lot deeper."

Changing the speed at which a spinnerbait is retrieved will give it an entirely different action. A fast retrieve, just under the surface, is known as "burning" a spinnerbait. A slow retrieve, in which a bait is allowed to ease through the water just fast enough for the blades to keep turning, is "slow-rolling." The former is a great way to catch active, aggressive fish, and the latter method will probe into areas where fish might not be as willing to move a great distance to feed on something shiny that passes by.

"A spinnerbait is one of those baits that a lot of people really don't know how to fish," Elliott said. "But it will catch fish just about anywhere and anytime you want it to."

Dan Kibler is a freelance writer living in Winston-Salem.

There's Toms in Them Thar Hills

WHAT ARE THE ROLLOVER RATINGS OF A 2000 JEEP? Those were my white-knuckle thoughts as I clung to the steering wheel while following a farmer in his truck up an Alleghany County mountainside pasture last April.

The gentleman had kindly granted me permission to go turkey hunting on his property the next morning and was giving me a tour. But the mountainside's verticality made me fear that my vehicle would overturn. Finally we came to the pinnacle, but not before I had strongly considered abandoning the ascent.

The mountainsides of Alleghany, Ashe and other counties in northwestern North Carolina hold some of the steepest turkey terrain not only in the Tar Heel State but also in the entire South.

"I define the mountains as those counties and parts of counties along and above the Blue Ridge escarpment with an elevation of over 2,000 feet or so," says David Sawyer, the upland game bird biologist for the N.C. Wildlife Resources Commission who lives in Wilkes County. "The Blue Ridge Parkway pretty much runs across the region. When that escarpment falls off, it really drops—almost like the edge of a table does.

"On the southwestern end of the region's eastern edge lies Polk County and on the other end are Alleghany and Ashe counties—certainly two of the counties with the highest turkey densities in the state. Northern Wilkes County is also on that end, and about one-third of Wilkes is on the escarpment."

Hunting turkeys in the mountains requires some changes in strategy, not to mention a strong set of legs.

WRITTEN BY BRUCE INGRAM

NATIONAL WILD TURKEY FEDERATION

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Mountain turkey hunting presents some different challenges for flat-land hunters, particularly when it comes to calling toms in close for a shot.

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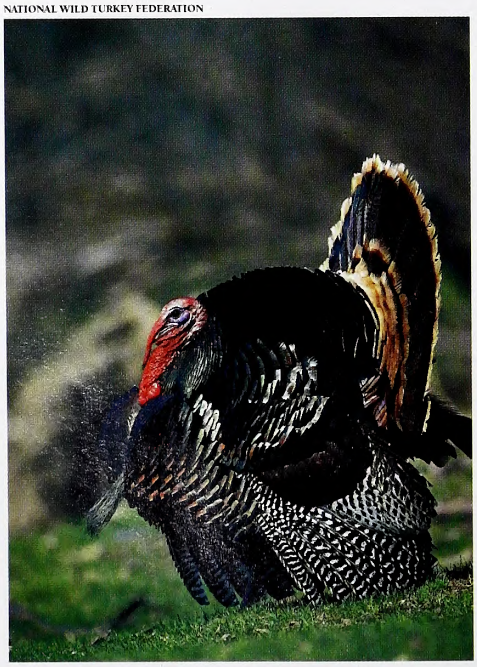

GAINING ACCESS. The first step toward hunting North Carolina's mountains is gaining access to private or public land. Sawyer says that many landowners in the region lease their properties; other farmers, though, are approachable—much more so for turkey season than for deer hunting.

Sawyer says there are two ways to approach these landowners. One is to find a connection; that is, to know someone who knows someone who is a property owner. That is how I gained access to that steep highland farm where I hunted. I have a friend in Sparta who is acquainted with a cattle rancher who is known to grant permission occasionally to hunt his spread. My friend gave me the rancher's e-mail address, and I proceeded to gain access after several exchanges of e-mails.

In that correspondence, I promised to be an ethical sportsman, to respect the property and to obey game laws. Upon arriving at the gentleman's land, I gave his family a present of my wife's homemade zucchini bread. Sawyer says such gifts, as well as a commitment to help a landowner with land management chores he might have around his place, are much appreciated and a marvelous way to gain permission.

The second way to approach landowners is to drive the back roads of the region and knock on doors. My success rate for this tactic is about one access gained for every six farms visited. Sawyer does say that with the increasing popularity of turkey hunting, gaining entrance to private land is becoming more difficult.

Another way to find a hunting spot is to choose public land, which Sawyer proclaims is "absolutely an option." State-owned game lands available for turkey hunting include Thurmond Chatham (which is known for its steep topography) in Alleghany and Wilkes counties, Buffalo Cove in Wilkes and Caldwell and Three Top in Ashe County. Sawyer lists the Pisgah National Forest, and in the southeastern mountains the Nantahala, as excellent examples of isolated, mountain-style hunting available to anyone.

PRIVATE-LAND FEATURES. Sawyer emphasizes that hunters on private mountain land should look for "patchwork farms."

"If you could view an area from a plane," he says, "and if that area from above looks like a checkerboard, with the red squares in woods and the black squares in crops and fields, then you would have found ideal turkey habitat.

"We biologists used to think that wild turkeys need unbroken forestland to flourish. Well, we were wrong. We now know that turkeys thrive best with lots of variety and edge. That edge-type habitat (such as where forests meet fields or cutovers meet cropland) is so important, especially for nesting and for poults and their need for a high-protein insect diet."

Alleghany and Ashe counties are famous for their mixed habitat. That "patchiness" also exists in the western mountain counties of Yancey, Madison, Buncombe and Henderson, among others.

The Alleghany County farm I hunted is a good example of broken habitat. On the left side of the property, a regenerating clear-cut borders a pasture, which itself abuts a mature white pine grove. The grove is next to yet another pasture, and it was there that I glimpsed a strutting longbeard around 10:30 one morning. For the next two hours, I called to the highly vocal tom before a hen claimed his attention and they wandered away together.

Earlier that morning on the upper side of the property, I had called to another gobbler that was sounding off in a woodlot that adjoins yet another pasture. Unfortunately, I did not have permission to hunt the woodlot, and I could never call the bird across the property boundary.

Mountain rills are another characteristic of these private lands, and they too draw turkeys. For example, on that same Alleghany County property, a stream winds its way down the mountainside, and oaks, beeches, maples and other trees shroud the waterway. The owner told me that he frequently observes turkeys following the creek in search of food, not just in the spring but throughout the year.

HUNTING THE BIG WOODS. North Carolina sportsmen who have never hunted the mountains should know that turkeys often exhibit reliable traits and a fondness for certain terrain features.

"One of the things I have noticed is that turkeys often roost on the sheltered side of

NATIONAL WILD TURKEY FEDERATION

GLOSSARY OF MOUNTAIN TERMS

North Carolina sportsmen who have never hunted this region should know that it possesses its own terms.

FINGER RIDGE – A narrow, long ridge that extends from a main ridge or the mountaintop.

SHELF – A flat place on the side of a mountain.

BENCH – A long shelf that may extend for many hundreds of yards.

SADDLE – A dip in the topography that often connects other terrain features such as shelves.

RILL – A cascading mountain stream with lots of waterfalls and plunge pools.

LISTENING POST – A high spot in the mountains, such as a peak, where hunters can hear for long distances.

HOLLOW – Often pronounced "holler," a cove that features hardwood stands and rills.

AS THE CROW FLIES – Actual distance but not mountain distance. A real challenge of hunting the mountains is that a bird gobbling on an adjacent ridge may be only 60 yards away "as the crow flies" but many hundreds of yard away in reality — the hollows can be that deep and extensive.

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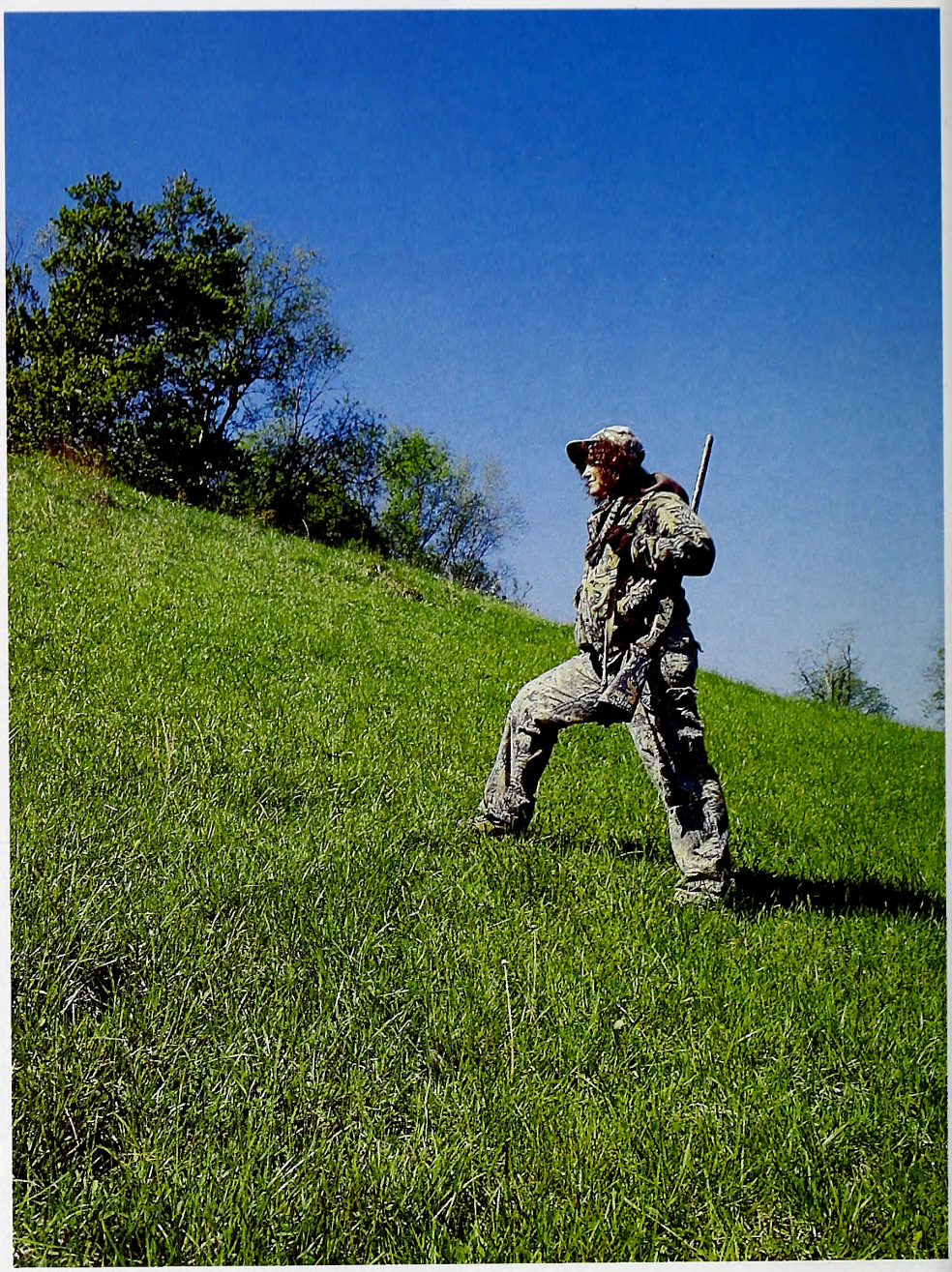
DAVID SAWYER'S QUICK TIPS FOR MOUNTAIN GOBBLERS

- When it rains, turkeys head for open fields.
- If the weather is cold, don't expect to find much scratching or many turkeys in unbroken forests. During cold periods, turkeys are more likely to be in areas with new spring green-up (field edges, lower elevations and creek bottoms).
- When the weather warms, look for the turkeys to return to the forest and vigorously scratch. Insect life begins to stir under the forest duff, as does emerging plant life, and the turkeys seem to know that instinctively.
- In the mountains, it's almost always better to set up above the birds and attempt to call them uphill. This is true even though turkeys often make a beeline for streams first thing after flydown.

HOW TO HELP A LANDOWNER

Sawyer suggests the following:

- Offer to put up "Posted" signs.
- Promise to look for trespassers and anything else that might be amiss.
- Give reports on wildlife sightings.
- Promise to shut all gates and not to drive over wet pastures.
- Pick up trash; remove downed trees from roads.
- Bring presents occasionally. All of "my landowners" relish my wife's homemade bread.



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a mountain," says Sawyer. "They especially will roost on a finger ridge coming down from the top if it has evergreens growing on it. Amazingly, turkeys often seem to know when the night will be windy, because they always seem to roost lower on the mountainside when that is the case.

"I also have noticed that big-woods turkeys often spend the middle of the day feeding, loafing and strutting on benches and shelves. Especially look for the birds to use saddles that lead to these types of areas. And any kind of open area or wildlife clearing will attract mountain birds."

PUBLIC-LAND GOBBLERS. Kip Hollifield, one of the commission's management biologists for the western region, says that the Pisgah and Nantahala national forests, as well as all the state-owned game lands in the mountains, offer quality turkey hunting, although the hunting pressure is considerable close to roads. To find unpressured areas, Hollifield offered these recommendations:

"I'd suggest hunters first choose a game land or two to concentrate on, and then purchase USGS [U.S. Geological Survey] topo quads or equivalent mapping software and thoroughly study the areas they would like to hunt before going out," he says. "*The Game Lands Map Book* provides good reference maps of all game lands and shows vehicle access and parking areas, but topo maps provide much greater detail of terrain features.

"Look for areas that are accessible only by foot to avoid heavily hunted locations. Hunters should scout the areas they've reviewed on maps to look for turkey sign and to become more familiar with the topography. One of the most important factors for highland hunters is to be in good physical condition before scouting or hunting. All the mountain game lands are steep and rugged, and a hunter not in good physical condition will be unable to cover a lot of ground, which is often important to increase chances of success."

Hollifield also suggests that hunters look for blocks of mature timber with rich, moist coves and an open understory. These coves often support herbaceous plants that turkeys prefer in the spring.

CALLING TACTICS. To state that calling strategies are different in the highlands than in the lowlands is merely to proclaim the obvious. Hollifield said that hunters need to verify the location of a bird before going after him.

"Topographic features such as ridges and hollows often distort gobbling," he says. "Many gobblers have been spooked by hunters moving in the direction of a bird that appeared to be farther away than he actually was. After locating a gobbler, hunters should always take time to locate a calling position that offers the best chance for calling the gobbler within gun range.

"Attempts to call a gobbler across a major terrain feature are generally unsuccessful. Mountain laurel and rhododendron thickets are common in the mountains and also are hard to call a gobbler through."

Hollifield adds that if a turkey is gobbling on the side of one mountain and a hunter is across from him on a facing slope, the tom will often answer calls but usually won't travel across. Take time to make a wide circle around him and maneuver onto the same slope he is on. Odds of calling the gobbler in will increase if you're on the same ridge or mountain.

"If you're calling in very open woods, try to use terrain features to your advantage, locating a calling position that will force the gobbler to be in gun range when he first appears," Hollifield said. "If you're in open woods that offer visibility far exceeding gun range, the gobbler will often hang up and strut and gobble out of range when he feels he should be able to see the 'hen' that's been calling. Most often the gobbler will become suspicious in this situation and walk away."

On the last day of the season, I returned to the Alleghany County farm. Two gobblers came within 40 yards of my position, but I was unable to see either because of the vagaries of the terrain. And so my season ended, but I'll be back next year—irresistibly drawn to the allure of North Carolina's highland toms.

Bruce Ingram is a freelance writer living in Virginia. He contributes regularly to a number of outdoor-related publications.

The best areas to hunt mountain turkeys have terrain that is broken into checkerboard patterns of woods bordered by fields.

NATIONAL WILD TURKEY FEDERATION

A PRIVATE- AND PUBLIC-LAND HOTSPOT

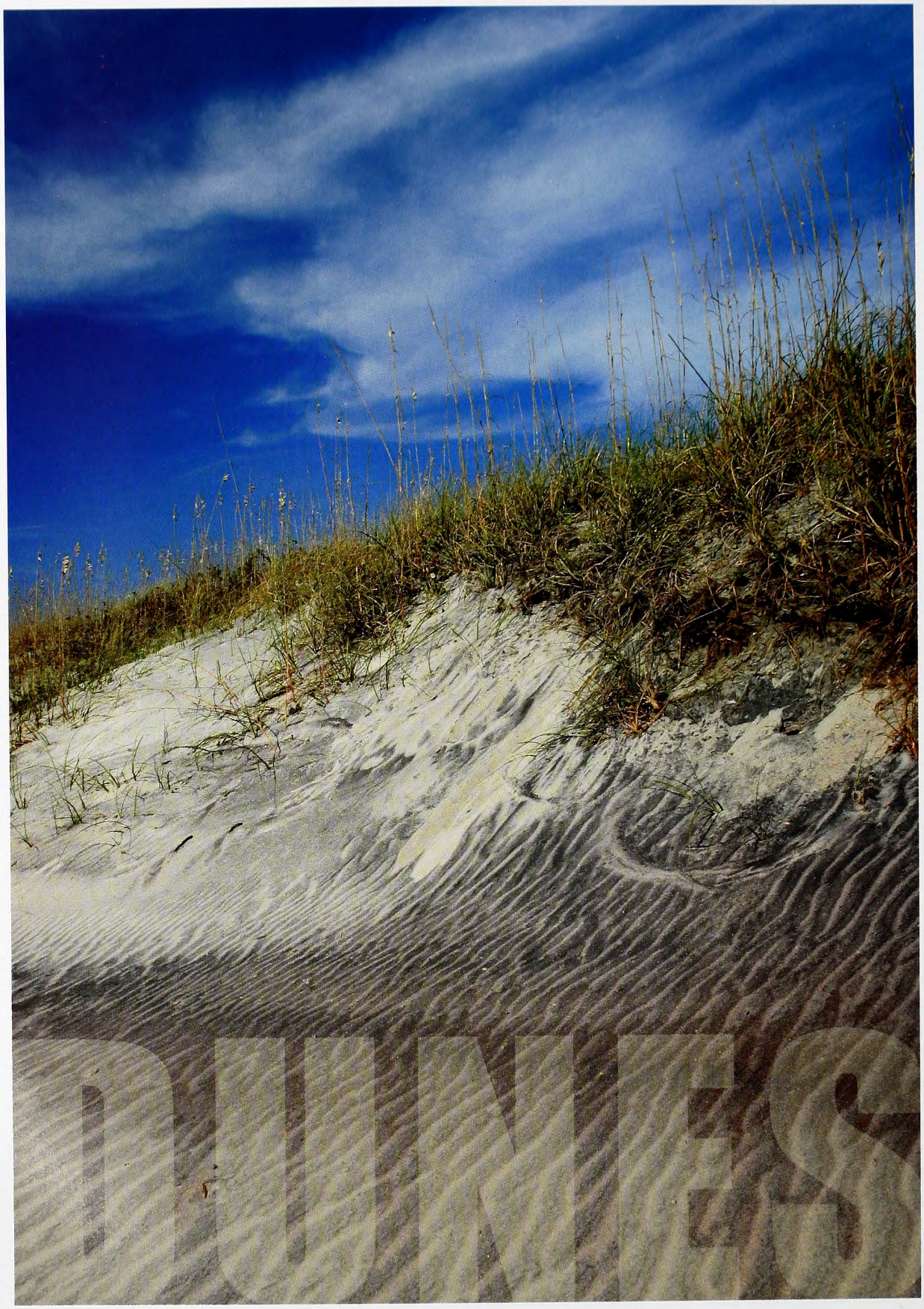
David Sawyer says that more and more private landowners and public land managers are realizing the importance of controlled burning to benefit both game and nongame species. Native warm-season grasses such as Indian grass and little bluestem often thrive after a burn. The regenerating growth draws insects, which in turn entice turkeys. Burns can especially attract wildlife in the unbroken expanses of the national forests.

MOUNTAIN BASE

One of my favorite places to hunt and fish in North Carolina is Alleghany County. Bob Bamburg, director of the Alleghany County Chamber of Commerce in Sparta, says that the area features a number of outdoor charms. Hiking and birding in the nearby mountains, fishing and paddling along the New River and its South Fork, and enjoying the outdoors at Doughton Park Recreation Area are just a few of the options.

– Bruce Ingram

THE HIDDEN LIVES OF DUNES



SCOTT TAYLOR

Passing quickly through the sand dunes on the way to the beach, you could walk right past a host of diverse creatures living in a surprising array of different dune habitats.

Mention sand dunes, and I think of my grandmother's paintings. For years, Bee lived within walking distance of the beach. She loved to paint, and she loved most to paint sand dunes. She sold untold numbers of sand dune paintings, and they hung in hotel lobbies, in people's homes, in galleries. In each one the sand dunes stand shoulder to shoulder, clad in sea oats bent forever by an acrylic breeze. Without fail she tucked away a background glimpse of rolling surf or placid sea. For Bee, sand dunes were something to pass over, or pass through, on the more pressing journey to the shore.

WRITTEN BY T. EDWARD NICKENS

"You've got to be a pretty tough customer to make a living in the dunes day in and day out."

For years I shared Bee's littoral perspective. Sand dunes meant little more than sand spurs and the burned bare feet that come from shedding the flip-flops too close to the parking lot. No longer. These days, the notion of sand dunes sends my mind to meadowlarks and fireflies. Thinking of sand dunes makes me think of alligators and legless lizards, rare mice and birds' eggs and cottontail rabbits, of all things. Like the one whose tracks I'm following on a windswept fall day along the southern North Carolina coast.

These tracks score the surfside toe of a dune ridge on Masonboro Island, an 8-mile-long oasis of beach, dune and tidal flat smack in the middle of the most populated stretch of the North Carolina coast. The rabbit prints are easy to spot, with their oversized hind feet placed delicately in front of dainty forepaws. Soon I pick up the prints of a fox, a creature no doubt even more intently focused on the rabbit's intentions. For a few feet we walk together, the rabbit, the fox and I. Next we're joined by the pugmarks of a raccoon. The twiglike tracks of a small bird. I lean down for a closer look, my face so close to the ground that I hear wind-driven sand grains rattle against the stout leaves of bitter panicum.

"It's an extremely harsh environment out here on the frontal dune," says David Webster, trudging up from the wrack line that marks high tide just a few feet away. An evolutionary biologist at the University of North Carolina at Wilmington, Webster has logged thousands of research hours on Masonboro's beaches. "There's not a lot of food, and there's virtually no cover or moisture. Those tracks come from opportunistic visitors foraging in the cool night. You've got to be a pretty tough customer to make a living in the dunes day in and day out."

But a suite of creatures is tough enough. Sand dunes, especially natural dunes that fringe the beachfront of undeveloped shorelines, host specialized communities of animals. From the sun-baked, windswept and storm-surge-scoured foredune beach to the complex overwash basins and maritime forests snugged against the rear dunes, dune habitat zones are far more varied than the human eye perceives. Move a few feet—from the toe of the dune to the dune slope, say—and new worlds emerge. Correspondingly, animal communities partition themselves as different species and exploit the varied microhabitats of foredune, dune ridge and dune swale. Understanding their exquisite

SCOTT TAYLOR

accommodations paints the natural history of sand dunes in an entirely different light.

Sand burrowers and sand catchers

Consider the curious sand wasp, one of the most watchable wildlife species of dunes, although few people keep an eye out for it. This is a gorgeous black and yellow tiger-striped creature, a half-inch long and glossy as a new penny. Its tireless effort would make a beaver long for a rest. Working alone, the female sand wasp painstakingly digs a burrow into hot dune sand. It's exhausting work. In the summer, sand temperatures can reach 120 degrees Fahrenheit, forcing the sand wasp to hover in the cooler air above the sand every few seconds to keep from overheating. Once she tunnels into cooler subsurface sediments she gets serious about progress, slinging sand out of the ever-deepening tunnel until she's satisfied. Now the real work commences. After locating and paralyzing a fly with her sting, she carts the insect back to the burrow and lays a single egg in the helpless body, a larder for the larva that soon will hatch to devour the host. While her young are growing most quickly, she may provision the burrow as frequently as every five minutes.

There's little chance of seeing a sand wasp sighting on a windy day like today, but with Webster's keen eye, we find more signs of life in the sand. He points out the stems of sea oats shorn of their seeds and the tracks of a small rodent below. "House mouse," he figures. We've moved just a few feet from the flat beach onto the slope of a dune, where a thick patch of sea oats sways landward. It would be difficult to imagine Atlantic Coast dunes without sea oats—both literally and figuratively. Their large root mats can spread out for 20 feet

SCOTT TAYLOR

Many types of burrowing creatures find food and habitat in dunes. The ghost crab, the sand wasp and the red fox live near the shore, while the river otter may leave only footprints as it passes through.

NCWRC

HARTMUT WISCH

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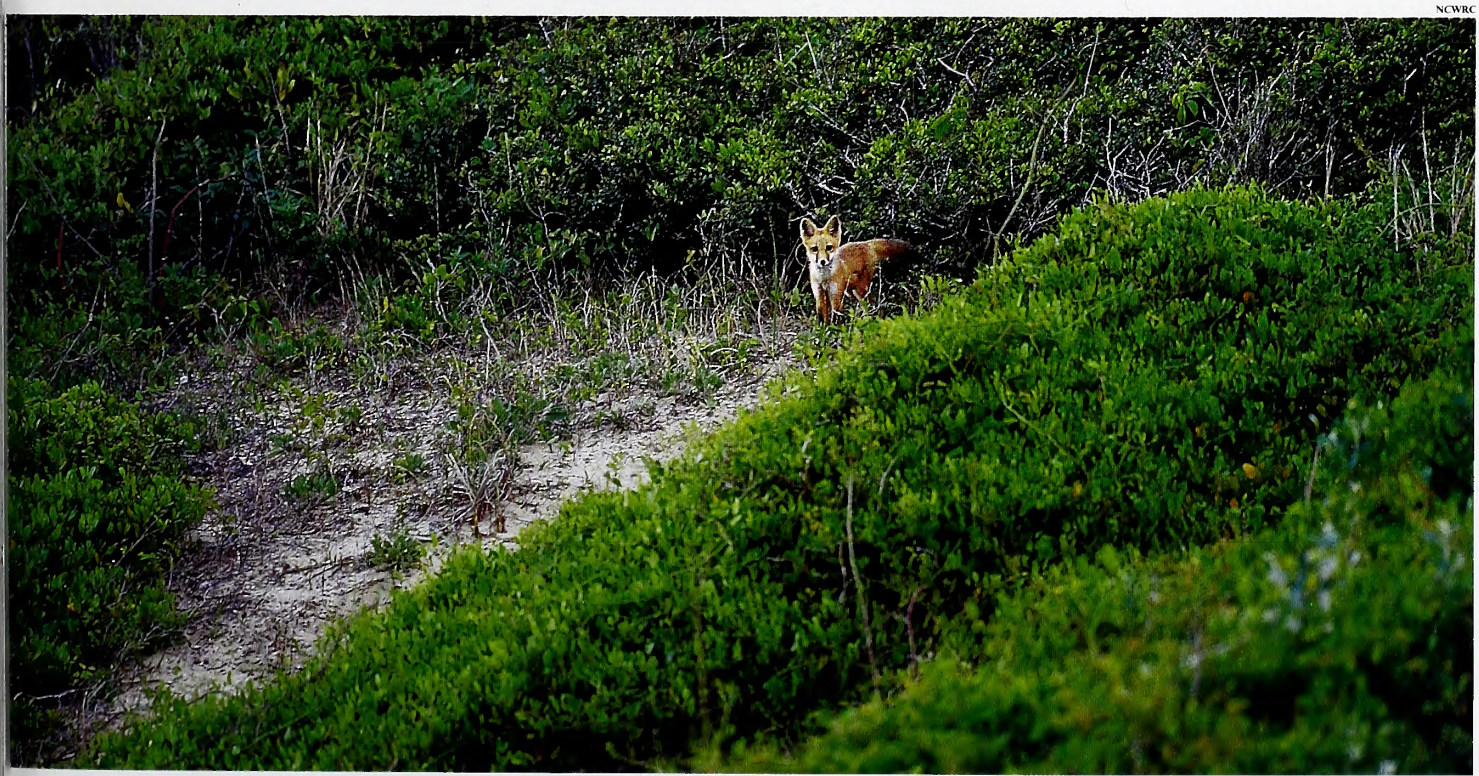

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The royal tern has adapted to nest and roost in the open: Its eggs and chicks are camouflaged to hide in plain sight. Below: The Eastern glass lizard is an uncommon but beautiful resident of sand dunes.

or more and are the saving matrix for dunes under siege by storm and tide. Sea oats are one of the best sand-trapping mechanisms on the beach, and many a dune began life as a few grains of sand falling into the "wind shadow" on the lee side of a seat oat sprig. Those sand grains pile up to create an even higher windbreak, which siphons more sand from the wind. Sand grain by sand grain, a dune is born.

What makes sea oats such great dune anchors is that the growth of a dune that forms around the plants isn't limited to the height of a static object such as a sand fence. As the dune grows taller, so, too, do the sea oats.

TODD PUSSER

"That's the really beautiful part of the relationship between sand dunes and sea oats," explains David Nash, a coastal management specialist for the N.C. Cooperative Extension Service and a noted expert on dune ecology. "They grow in harmony, dune and dune plant, up and out together. If a sand dune formed around a tiny sprig of sea oats, the roots will go all the way to the bottom of the dune, even if it's 10 feet tall."

The harmony extends to the animal kingdom. Ghost crabs tunnel deep into dune sands that are tight and compact thanks to sea oat roots. The sea oats help hold moisture, which attracts other dune plants. Once I dragged my sea kayak onto the beach at Cape Lookout and crossed the primary dune ridge in search of a campsite. It was late and dark, and the moist "slack" behind the frontal dune—the name comes from the Nordic *slakken*, meaning a low, wet place—was awash in the luminous light of fireflies. There were hundreds alight at any given time, a glittering landscape of yellow white paisley patters extending for a quarter mile. I'd never seen anything like it.

Sea oats are the foundation for complex habitats. The beach house my family rents each summer on Emerald Isle is one of three clustered, 50-year-old cypress cottages completely out of character with the soaring megamansions nearby. There is no yard. A weathered wooden boardwalk arches over stable dunes where sea oats rise above a wild tangle of vegetation. All those leaves and vines

hold in moisture and provide shade and safe resting places for an array of dune wildlife. I share morning coffee with Fowler's toads. My kids chase Carolina anoles through the brambles. A herp-loving neighbor once told me he's found Eastern glass lizards in his dunes. These legless lizards are uncommon and uncommonly beautiful. I'd trade a hundred dolphin sightings for a glimpse at just one of these.

Nash, rambling

Cresting the dune ridge, Webster and I spot Nash stooping low, hands to the sand. "Look around," he instructs. "In 15 feet of distance we've seen a remarkable change in the character of the dunes." The dunes themselves block wind and salt spray, allowing a flush of summer annuals—dune spurge, camphor weed, sea elder—to thrive, and to die. "All that organic material goes back into the sandy soil," Nash explains. "More moisture, more nutrients. A constant cycle of growth and decay, and the result is a huge increase in biodiversity."

On the dune ridge, large lizards called six-lined racerunners dash from shady spot to shady spot in an effort to keep their toes cool. As the primary dune ridge gives way to moister swales, a surprising diversity of reptiles and amphibians shows up: corn snakes, black snakes, Fowler's toads and the Eastern hognose snake, a pug-nosed character that alternates between faking strikes and faking dead when faced with danger.

One reason so many reptiles hunt the swale zones behind frontal dunes is the easy seasonal pickings provided by the swale's most evident inhabitants: beach- and dune-nesting birds. A large and complex suite of terns, gulls and other waterbirds crowd the flats behind the primary dune line. They seek out various microhabitats created as high winds drive waves through gaps in the dunes, depositing sand and shells in what coastal ecologists call overwash fans. These habitats are to beach-nesting birds what fire burns and forest gaps are to neotropical migrants that target early successional growth.

"And there's a gull or tern species that seems to prefer every stage of vegetation, or lack of it," Webster explains. Black skimmers, American oystercatchers and gull-billed terns require bare sand or broken-shell beaches with very sparse vegetation. Change the habitat ever so slightly and you change the inhabitants. Add a bit of bluestem or salt-meadow hay and the bare-ground nesters drop out, replaced by great black-backed gulls and brown pelicans, the royal and sandwich terns. Willets seek out the thick thatches of grass. More organic matter begets even more: Wax myrtle takes root, and black-crowned night herons and little blue herons arrive.

On a wide-open beach, the federally endangered piping plover might prepare a half-inch-deep depression in the sand, but that's about the extent of its homemaking. It's not due to laziness. By laying eggs directly on the sand, the plover ensures that rain and surf spray drain quickly away. The birds themselves, like other beach nesters, are the color of sand. Their eggs are speckled with brown and black splotches that blend in perfectly with bits of coquina and clamshell. Sitting motionless, the birds can spot predators at a great distance. Nesting with scores, sometimes hundreds, of similarly minded birds, dune nesters can swiftly mobilize a swirling, squawking mass of parents—an effective deterrent to a fox or snake hunting nearby.

The problem is, this community of sand dune wildlife requires constant change, and that's an environment hardly compatible with human development. "We've stabilized our beaches so much that they're not changing anymore," laments David Allen, a coastal bird specialist with the N.C. Wildlife Resources Commission.

Plant a house behind a frontal dune, and instantly a storm-surge-driven overwash event isn't part of the natural cycle that creates nesting habitat for birds and hunting grounds for hognose snakes. Instead it becomes a catastrophic assault on personal property. "So many animals," Allen says, "depend on the kind of dynamic change society seeks to minimize as it protects buildings."

But coastal ecologists hope that more people will come to appreciate the beauty of sand dunes that shift and storms that carpet dune fields with revitalizing sand. Such a perspective would have been a sea change for my grandmother. Bee's dunes were frozen in time and devoid of animal life save for the occasional gull riding the breeze. Had she known of the sand wasp's tireless peregrinations or the black skimmer's complete fidelity to barren sand, she could have spent another lifetime painting the fascinating life in the dunes, and not the beauty just beyond. ⬘

T. Edward Nickens is an editor-at-large for Field & Stream *and a regular contributor to* WINC.

NCWRC

TODD PUSSER

Even if they do not live in sand dunes, reptiles such as the corn snake as well as birds frequently feed and rest there.

The problem is, this community of sand dune wildlife requires constant change, and that's an environment hardly compatible with human development.

Every spring, flocks of shorebirds migrate north to breed. Every spring, some of these migrants settle down and nest here in North Carolina. These small shorebirds come for some

Coastal Courtship and Roadside Romance

written and illustrated by Anne M. Runyon

WILSON'S PLOVER

Plovers are small- to medium-sized shorebirds in the large Charadriidae family. They have rounded heads, large eyes, short stout bills and medium-length legs. Seven of North America's 12 plover species visit North Carolina during their fall or spring migrations. Some fly from South America, where they overwinter, all the way to the Arctic for breeding. But only three plover species, the piping plover, Wilson's plover and killdeer, stay to breed in North Carolina.

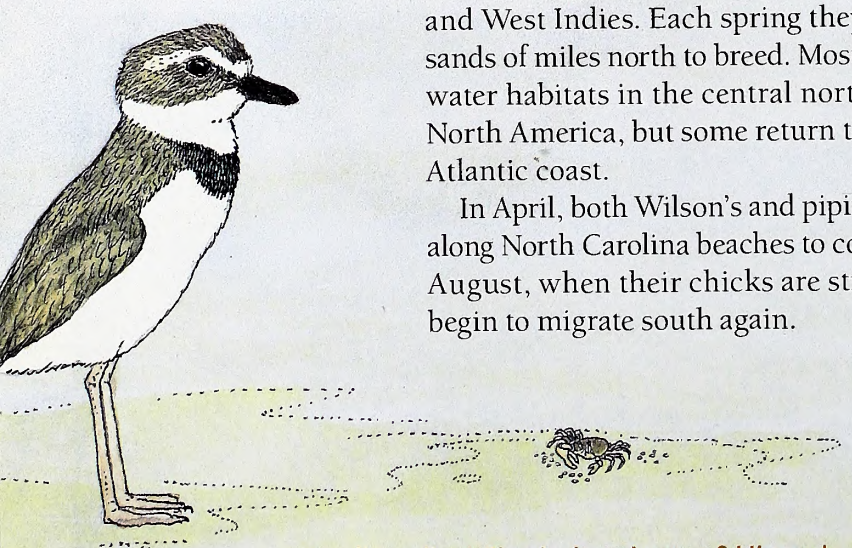
ON THE MOVE

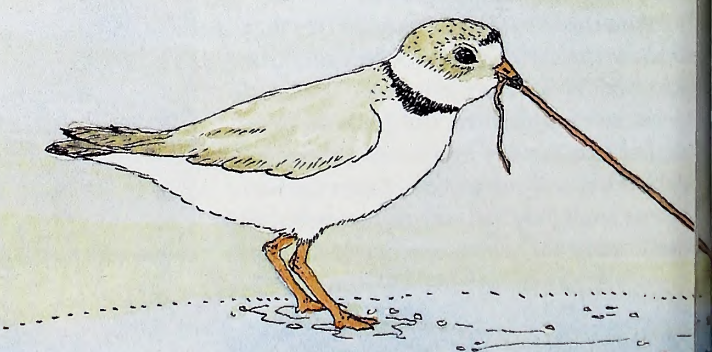
Many killdeer overwinter in Central America and migrate north to breed. In mild regions such as North Carolina, killdeer also establish year-round territories or migrate only short distances in response to winter's weather.

Most Wilson's plovers overwinter along the coasts of Central America.

Piping plovers overwinter along coastal beaches from North Carolina south to the Yucatan, Bahamas and West Indies. Each spring they migrate thousands of miles north to breed. Most return to freshwater habitats in the central northern plains of North America, but some return to nest along the Atlantic coast.

In April, both Wilson's and piping plovers arrive along North Carolina beaches to court and nest. By August, when their chicks are strong fliers, they begin to migrate south again.



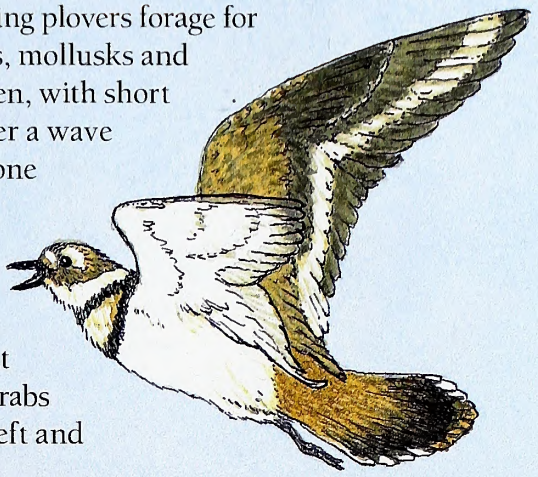


Standing tall, a Wilson's plover hunts a fiddler crab. A piping plover snags a marine worm.

VISUAL HUNTERS

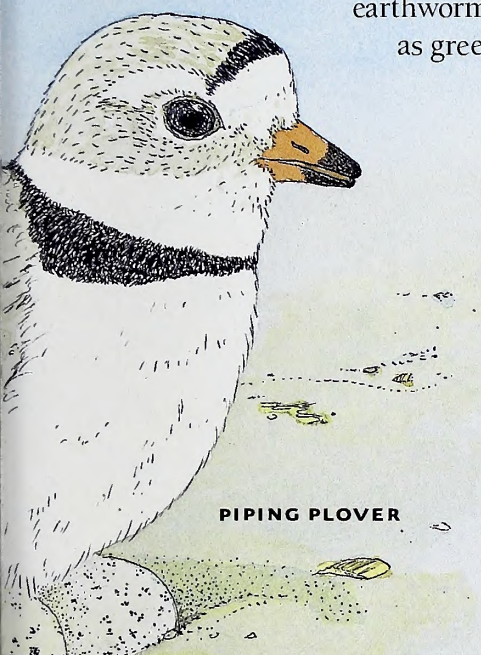
All plovers are visual hunters, chasing prey on the ground. Piping plovers forage for invertebrates such as marine worms, insects, small crustaceans, mollusks and marine animals' eggs. A plover stands tall to scan the beach. Then, with short dashes and pecks along the water's edge, it pursues its prey. After a wave recedes, leaving a film of water on the beach, a plover often holds one foot out and vibrates it against the wet surface before pecking. This may stir a hidden invertebrate, and the plover sees its movement under the surface.

Wilson's plovers hunt for fiddler crabs during low tide on mud or sand flats. A hungry hunter grabs one leg of a crab with its stout bill, and shakes till the crab loses its leg and falls. Then the plover grabs another leg and shakes again. Soon the fiddler crab has no legs left and … *gulp!*, the plover eats the crab.



KILLDEER

The plaintive call *"killdeer! killdeer! killdeer!"* makes killdeer the noisiest of our three nesting plovers. Killdeer are inland shorebirds who hunt for earthworms, insects, snails and other invertebrates, small vertebrates such as green tree frogs, and some seeds.



PIPING PLOVER

JUST THE RIGHT NEST SITE

In March, killdeer build simple, scraped nest depressions on gravelly roadsides, grassy fields, lawns and other open areas.

In April, a male piping plover claims his nesting territory on an open stretch of sand above the high tides and courts his mate. He chooses a spot near a beach where the waves are gentle. This will be a safe foraging area for his chicks, once they hatch. The mated pair of plovers often settles near a colony of least terns, who build nests close together and noisily defend their colony from predators.

Wilson's plovers also nest on sandy beaches above the high tides, sometimes close to a piping plover's territory. They choose sites close to the flats where fiddler crabs, their favorite prey, live.

PRECOCIAL CHICKS

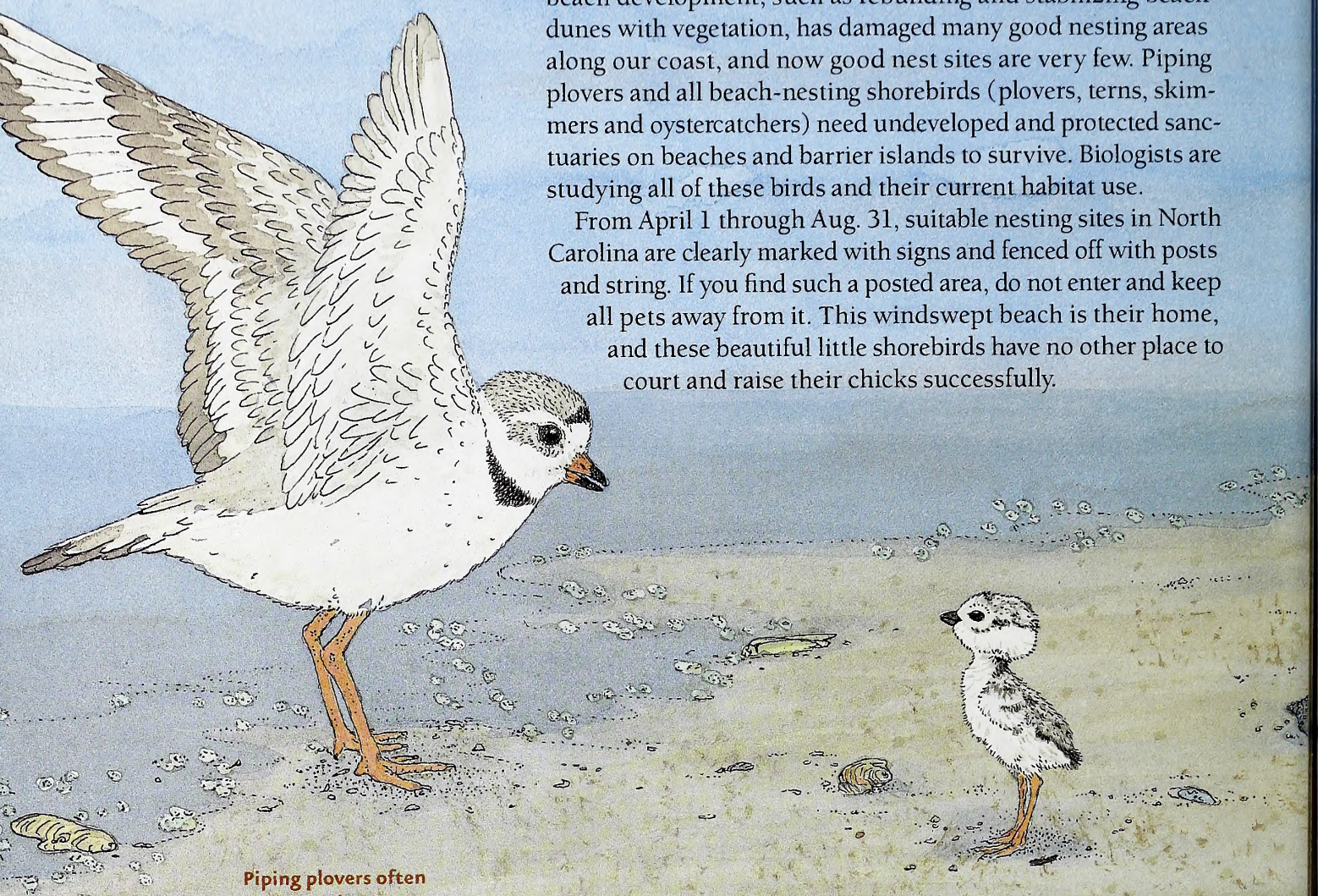
By taking turns warming or shading the eggs in their nest scrape, plover parents continuously brood their eggs. Precocial plover chicks can run and peck for food soon after hatching, but cannot fly until they have fledged two or three months later. Chicks will follow a parent to a foraging area and feed themselves, but during their first two weeks they must often snuggle under a parent's breast to keep warm. When frightened or warned by an alarm call, the chicks lie flat and still. Their down feathers blend with the beach sand or roadside gravel, and they seem to disappear. Parents vigorously protect their chicks by threatening or leading away predators.

Large feet and tires can easily crush well-camouflaged chicks, because they remain motionless, hiding.

PROTECTING OUR BEACH NESTERS

The piping plover is federally listed as endangered or threatened throughout its range in Canada and the United States. Human beach development, such as rebuilding and stabilizing beach dunes with vegetation, has damaged many good nesting areas along our coast, and now good nest sites are very few. Piping plovers and all beach-nesting shorebirds (plovers, terns, skimmers and oystercatchers) need undeveloped and protected sanctuaries on beaches and barrier islands to survive. Biologists are studying all of these birds and their current habitat use.

From April 1 through Aug. 31, suitable nesting sites in North Carolina are clearly marked with signs and fenced off with posts and string. If you find such a posted area, do not enter and keep all pets away from it. This windswept beach is their home, and these beautiful little shorebirds have no other place to court and raise their chicks successfully.



Piping plovers often return to the same nest area year after year.

Get Outside

If you live inland in North Carolina, listen for that distinctive "killdeer, killdeer!" call this spring, and you may find a nesting pair with chicks in your neighborhood. Be sure to take binoculars along with you when you go looking for nesting plovers, both at the coast and inland. That way you can watch from a safe distance and not disturb their nesting success. Keep your pets inside or on a leash, especially during the nesting season, and you can help these plucky little birds survive.

Read and Find Out

- "Shorebirds of North America: The Photographic Guide" by Dennis Paulson, Princeton University Press, 2005.
- "The Sibley Guide to Bird Life and Behavior" by David Allen Sibley, Knopf, 2001.

In *Wildlife in North Carolina:*

- "Out for the Count" by Jeff Beane, December 2006.
- "Feather Chase" by Phillip Manning, April 2002.
- "To Save an Island" by Ida Phillips Lynch, October, 2001.

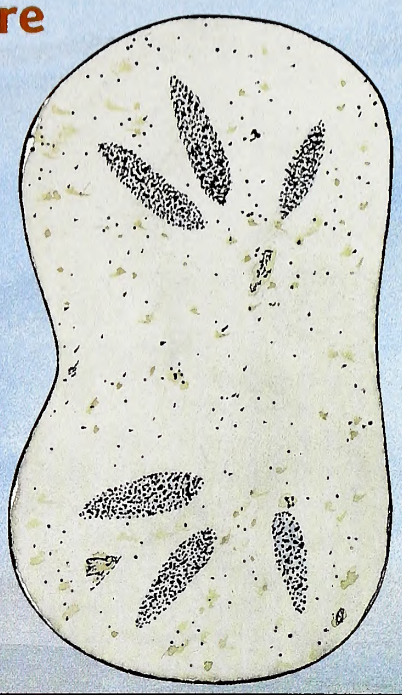
On the World Wide Web:

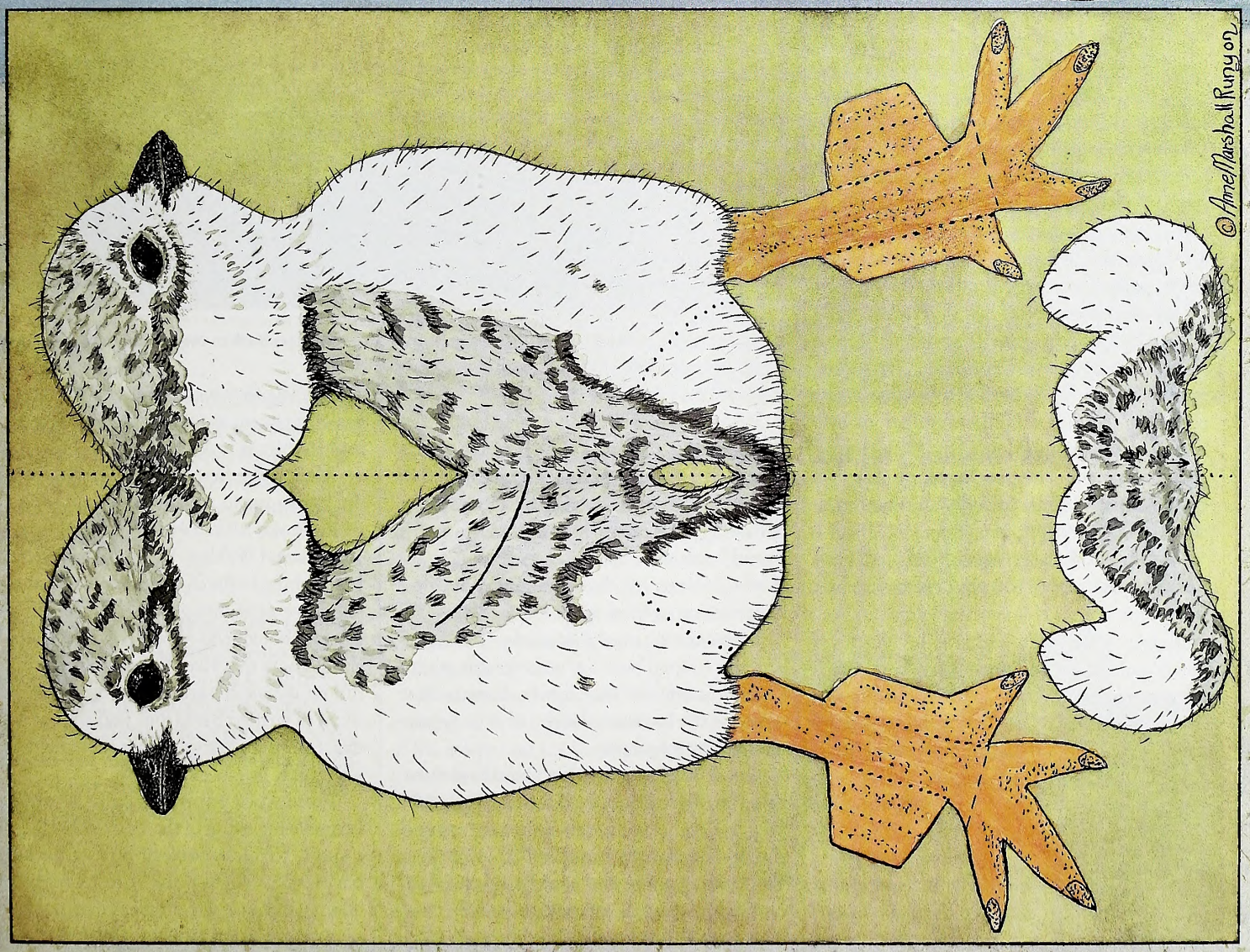
- To learn more about plovers, other shorebirds and about Audubon North Carolina's many coastal sanctuaries, visit: www.ncaudubon.org.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Make a Piping Plover Chick Paper Sculpture

1) Cut out the sandy shape with the footprints. Set aside.
2) Cut out chick's rectangle and fold in half along the · · · line.
3) Cut out both wings and chick along the black lines.
4) Cut wing slot, and then unfold your chick and his wings.
5) Crease toes up along --- line.
6) Fold leg flaps down along · · · line and glue together. (Chick will have little triangular "boots.")
7) Gently crease thighs along curving · · · lines.
8) Slide wings into slot, arrow pointing forward.
9) Glue tail tip together, and glue face together at beak.
10) Match chick's toes to his footprints. Glue in place.





This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Roanoke Dividing Line Fades into History

Striped bass fishermen on the Roanoke River no longer have to be concerned with separate spring harvest seasons on the upper and lower portions of the river.

In late January, N.C. Wildlife Resources Commission executive director Richard Hamilton issued a proclamation that opened the entire river management area to striper fishing from 12:01 a.m. March 1 to 11:59 p.m. April 30. The season will be closed by proclamation on or before April 30, if the allowable catch of 137,500 pounds is met.

The management area extends from the mouth of the river at the Albemarle Sound upstream to the Roanoke Rapids dam. Prior to this season, striper season on the Roanoke ran from March 1 through April 15 on the lower part of the river (from the U.S. 258 Bridge at Scotland Neck, downstream) and March 15 through April 30 upstream of the bridge. The proclamation extends the season by two weeks, provides additional fishing opportunities and simplifies regulations by removing the dividing line between the upper and lower river. The proclamation also includes the Cashie, Middle and Eastmost rivers and their tributaries.

During the spring season, no striped bass less than 18 inches in length or between 22 inches and 27 inches may be possessed. Only one fish in the two-fish-per-day creel limit may exceed 27 inches.

MELISSA McGAW

Anglers flock to the Roanoke in striper season.

Restoration of the Albemarle Sound/Roanoke River striped bass population has resulted in a world-class fishery enjoyed by thousands of anglers each year. Each spring, beginning in March, striped bass in Albemarle Sound begin their spawning migration up the Roanoke River. At that time, the Wildlife Commission opens a limited striped bass harvest season on the Roanoke. Timing of the striped bass harvest season, along with protective size limits, ensures that most of the harvest consists of 3- to 5-year-old male striped bass.

Good numbers of striped bass first move into the lower Roanoke River during mid-March. Catches at that time are best around the Plymouth area near the N.C. 45 bridge. The lower Cashie and Middle rivers, also crossed by the N.C. 45 bridge, can be productive as well. As springtime progresses into April, stripers make their way up the river and by the first week in April, the action really picks up at Jamesville, Williamston and Hamilton.

Also by the first of April, the first stripers are beginning to appear in the upper reaches of Roanoke River near Scotland Neck, Halifax and Weldon. By mid-April, striped bass fishing in the upper areas is in full swing and it seems as though the entire length of the river is shoulder-to-shoulder stripers. Anglers should note that river flows and weather conditions dictate the arrival and upstream movement of striped bass from year to year so the exact timing of striped bass movements can vary a few weeks either way.

From April 1 through June 30 on the Roanoke upstream of the U.S. 258 bridge, only a single barbless hook or lure with a single barbless hook (or hook with its barb bent down) may be used. Anglers may not possess stripers from the Roanoke except during the March 1 to April 30 season.

CALENDAR OF EVENTS

Wednesday–Sunday, April 17–22

Join the festivities and celebrate the shad run on Contentnea Creek at the 37th Annual Grifton Shad Festival. Most activities take place on April 21–22. Contact (252) 524-5168 or visit www.grifton.com.

Sunday April 22

Take a cruise to view the nesting grounds of colonial waterbirds on the lower Cape Fear River. Walker Golder of Audubon North Carolina and other bird experts will speak during the trip, which originates out of Southport. Visit www.capefeargarden club.org or e-mail Sandra Kittinger at skittinger@gmail.com.

Friday–Sunday April 27–29

Check out the seventh annual Southern Side-by-Side Championship at Deep River Sporting Clays near Sanford. Competitions will be held for side-by-side shotguns, both of various gauges. Exhibitors include such gun-makers as Atkin, Grant & Lang, Charles Boswell, FAMARS, Holland & Holland and Polli. Contact (919) 774-7080 or visit www.withersravenel.com/DeepRiver.

Learn about foraging food off the land at the N.C. Wildfoods Weekend at Betsy-Jeff Penn 4-H Camp near Reidsville. Visit www.wildfoodadventures.com/northcarolina.html or call Debbie Midkiff at (919) 489-2221.

Saturday April 28

Join an early celebration of International Migratory Bird Day with a festival from 9 a.m. to 3 p.m. at Blue Jay County Park near Raleigh. In addition to bird-watching, events include preschool story times and classes and hikes for both adults and children. Contact (919) 870-4330 or visit www.wakegov.com/parks.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

Daniel New Marine Fisheries Director

N.C. DIVISION OF MARINE FISHERIES

Louis Daniel has been named as the new director for the N.C. Division of Marine Fisheries and took over his new duties Feb. 1. Daniel, 43, replaced Preston Pate, who served as the division's director since 1997.

The Division of Marine Fisheries has the lead role and responsibility in managing and regulating the state's saltwater fisheries. The saltwater fishing industry in North Carolina is a $1 billion a year enterprise. North Carolina's estuaries and coastal waters are nursery areas for fisheries extending up and down the Atlantic seaboard.

"I'm looking forward to working with Louis in his new capacity," said Bill Ross, secretary of the N.C. Department of Environment and Natural Resources. "Our fisheries are such an important part of the economic and cultural fabric of North Carolina, serving as both a livelihood and a recreational pastime for many of our residents. Louis' extensive knowledge and his ability to manage complex fisheries issues will make him an effective leader in this important role."

Daniel began working with the N.C. Division of Marine Fisheries as a biological supervisor in 1995. For the past nine years, he has served as an executive assistant to the division director, working extensively with the South Atlantic Fisheries Management Council where he helped develop management policy for fisheries in federal ocean waters extending 200 miles offshore. He served as the chairman of the council from 2004 to 2006 and also serves on numerous management boards for the Atlantic States Marine Fisheries Commission, a compact of the 15 East Coast states that regulate nearshore migratory fisheries.

Daniel also has had oversight of the division's fishery management plan process, coordinating development of long-term management strategies for North Carolina's most economically significant fisheries. He also works closely with the N.C. Marine Fisheries Commission, serving as a technical adviser on numerous issues. Prior to working with the division, Daniel worked with the U.S. Fish and Wildlife Service for one year.

Daniel received his Ph. D. in marine science from the College of William & Mary, his master's degree in marine biology from the College of Charleston and his bachelor's degree in biology from Wake Forest University. A native North Carolinian, Daniel grew up in Pinehurst. He and his wife, Ruth, live in the Morehead City area with their two children, Josie and Louis.

Whooping Cranes Killed in Florida Storm

All but one of 18 juvenile whooping cranes that were led to Florida in mid-January by ultralight aircraft died in the violent storms that swept through central Florida on Feb. 1 and 2. The birds were part of an attempt to establish a second migratory flock of the endangered species.

Workers had checked the birds on the evening of Feb. 1, but because of the severity of the storm and the location of their pen at Chassahowitzka National Wildlife Refuge, personnel were unable to return to the cranes until the following afternoon. The lone surviving juvenile was located three days later. Officials suspect the other birds were drowned in an unusually powerful storm surge.

The loss of the 17 birds reduced the population of the flock, which migrates from Wisconsin to Florida, to about 64 individuals. A larger flock of about 200 birds migrates from Canada to the Texas Gulf Coast. Another 60 nonmigratory birds live in Florida.

Each year, the juveniles are led to Florida by ultralights in order to learn the migration route. Afterward, they migrate on their own. Recently, the cranes have been spotted in North Carolina as they migrated ("Winter of the Whooping Crane," Oct. 2005).

INTERNATIONAL CRANE FOUNDATION

By 1941, approximately only 20 whooping cranes remained in North America. Today's population exceeds 300 birds.

Kerr Lake Produces Another Record Drum

When it comes to catching really big freshwater drum, Kerr Lake is the place. For the third time in three years, a new record drum has been hauled out of the lake that sits astride the North Carolina-Virginia border.

On Nov. 27, Daniel T. Stotts of Browns Summit landed a 34.5-inch long freshwater drum that weighed a whopping 22 pounds, 12 ounces. He was using a minnow on 6-pound test line.

"I had a minor heart attack!" he joked. "It took 20 minutes to get the fish to the top of the water, and then I immediately knew what I had. I've caught drum before, usually about 4 to 5 pounds. There's a whole lot of difference with 22 pounds. And to get the record, and by that big of a margin, is pretty cool."

The previous record was 17.8 pounds, caught by Paul Riggs Jr., who broke his own record of 16 pounds, with both those catches coming in December 2003.

Corey Oakley, a fisheries biologist with the N.C. Wildlife Resources Commission who certified the catch, said the record freshwater drum now resides at the N.C. Museum of Natural Sciences, a donation from Stotts.

The freshwater drum, which is related to the red drum and black drum, is native to the Mississippi River drainage basin. It is found in the North Carolina mountains and in Tennessee, where the world record, a 54.5-pounder, was landed in 1972. Commission biologists are not sure how freshwater drum came to inhabit Kerr Lake, but suspect it was put there by fishermen.

To qualify for a state record, anglers must have caught their fish on a hook and line, must have their fish weighed on a certified scale witnessed by one observer, have the fish positively identified by a qualified expert from the commission and submit an application with a full, side-view photo of the fish.

For a list of all freshwater fish state records online, go to www.ncwildlife.org. For more information on fishing in North Carolina's public, inland waters, call the commission's Division of Inland Fisheries, (919) 707-0220.

IN SEASON

This month, these hunting seasons are open in North Carolina:

Youth Turkey Hunt Day: April 7 (private lands only).

Hatchery-Supported Trout Waters: April 14 through June 30.

Wild Turkeys (bearded only): April 14 through May 12.

Roanoke Striped River Bass: Continues through April 30.

Check the *2006–2007 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

Raver Red Drum Art Commemorates New License

The N.C. Marine Fisheries Commission is selling a limited-edition print to commemorate the launch of the state's first coastal recreational fishing license. The print, by

North Carolina artist and former *Wildlife in North Carolina* editor Duane Raver, depicts red drum chasing a school of finger mullet in an estuary. The Marine Fisheries Commission decided it was fitting to have the red drum, the state's official saltwater fish, serve as the subject for this print.

The cost is $50 for a signed and numbered print and $150 for a signed and numbered artist's proof. The print size is 12 by 14 inches. Visit www.ncdmfstore.net to view the print or place an order.

Starting Jan. 1 of this year, North Carolina for the first time required recreational anglers fishing in the state's coastal waters to have a fishing license. The Coastal Recreational Fishing License is available on a 10-day, annual or lifetime basis, or can be purchased with a variety of licenses issued by the N.C. Wildlife Resources Commission.

Proceeds from the sale of the print will be placed in the Marine Fisheries Commission's Conservation Fund to conserve and protect North Carolina's marine resources through educational initiatives.

ON PATROL

During a recent aircraft detail, Wildlife Sgt. Mitchell Kirkland observed a person shining fields with a spotlight near a closed manufacturing facility. Master Officer Tim Bullock and Officer Daniel Vogel stopped the violator, only to realize he was a security guard. The subject stated that his job was to patrol the plant several times a night.

When he was questioned about whether he possessed a firearm, he said he did not. Upon closer observation, a .22 rifle was located under the edge of the front seat. The man was not certified to carry a firearm while on duty. He said he didn't know the gun was there, and that he was just shining the light so he wouldn't run over a deer. The security guard was charged with night deer hunting.

ILLUSTRATED BY JACKIE PITTMAN

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ Lifetime Magazine Subscription to *Wildlife in North Carolina* $150
(Please allow up to 6 weeks for your subscription to begin.)

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

MLIFE7

Make checks payable to: *Wildlife Endowment Fund*

A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

Is It Better To Be A Generalist Or A Specialist?

written by Jeff Beane
illustrated by Jim Brown

DIFFERENT SPECIES ARE ABLE to coexist mainly by specializing. Animals and plants occupying very specific niches are considered "specialists" while more adaptable species are regarded as "generalists." When certain habitats or resources are abundant and stable, specialists gain advantages by developing adaptations for optimally exploiting those particular resources.

Distinctions between generalists and specialists aren't always precise or obvious. Some species may favor one strategy or the other in different situations, and degrees of specialization vary. All woodpeckers are specialists, but the red-cockaded woodpecker occupies a much more specific niche than the closely related downy. When longleaf pine covered the Southeast, the red-cockaded was the most abundant woodpecker. With the demise of that ecosystem, it became the rarest; the more versatile downy is now far more common and widespread.

As amphibians go, bullfrogs are generalists. They may attempt breeding in virtually any body of water, but their tadpoles seldom mature quickly enough to survive in temporary wetlands. In habitat once dominated by sand ridges, savannas and Carolina bays, gopher frogs were more successful. Conversion of that habitat to agriculture, and construction of farm ponds and other permanent water benefited bullfrogs and doomed fish-intolerant, ephemeral pond specialists like gopher frogs.

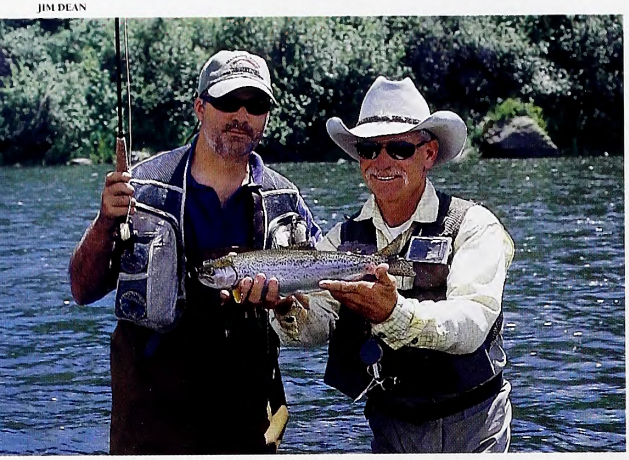
Historically, specialization reduced competition and encouraged coevolution, resulting in high biodiversity. Today, with virtually all habitats human-dominated and subject to rapid and radical change, generalists like opossums, raccoons, starlings, Norway rats, fire ants and Japanese stiltgrass have an overwhelming advantage. Ecosystem disturbance destroys niches, eliminates specialists and inevitably decreases biodiversity.

The Bug Connection

written by Jim Dean

Somewhere there may exist a person who regards fly-fishing for trout as merely a casual pastime. You and I would have nothing in common with this individual. Our introduction to flies and trout arrived as a blinding thunderbolt of life-changing energy that instantly metastasized into a full-blown obsession eclipsing all other earthly interests and obligations. Trout fishermen do not evolve—they are shot out of a cannon and lost over the horizon.

JIM DEAN



Scott Dean (left) and Lynn Sessions

Ironically, this has little to do with actually catching trout (and certainly not eating them), but rather with the successful perpetration of fraud. Fly fishermen are happiest when they can convince a trout that a wad of feathers tied on a hook is the insect equivalent of a juicy cheeseburger.

There are an estimated 20,000 species of aquatic and terrestrial insects and other foods that trout eat (mayflies, caddis, stoneflies, ants, beetles, hoppers, worms, minnows and the occasional cigarette butt). All of these, at least theoretically, can be imitated by the skillful and imaginative manipulation of feathers, hair and myriad other natural and synthetic products tied on hooks. Frustration is introduced into this equation by the near certainty that any trout feeding in front of us may refuse to eat all but one obscure representative of those species at any given time. The whole cult would collapse if trout—like their human pursuers—were content to eat Vienna sausages and pork and beans.

"Trout fishermen do not evolve—they are shot out of a cannon and lost over the horizon."

From the beginning, this symbiosis of trout and favored foods (especially aquatic insects) has driven the sport. Fly-fisher Dame Juliana Berners was imitating specific insects in Europe 500 years before Ernie Schwiebert coined the operative process in the title of his seminal book "Matching the Hatch," published in 1955. Some of us—but certainly not you or me, for Heaven's sake—have carried this mania for imitation to such extremes that we invite ridicule. The late humorist Ed Zern noted that his buddies at fish camp had extended the concept to "Mooching the Hooch" and "Mashing the Hash."

The result is that serious trout fishermen must become entomologists, which is why some of us carry little bug nets and texts that help identify the insects trout seem to prefer. Give us a day when our nets help us identify what the trout are eating, and our joy is unbounded—all the more so if we are the only anglers who've figured it out.

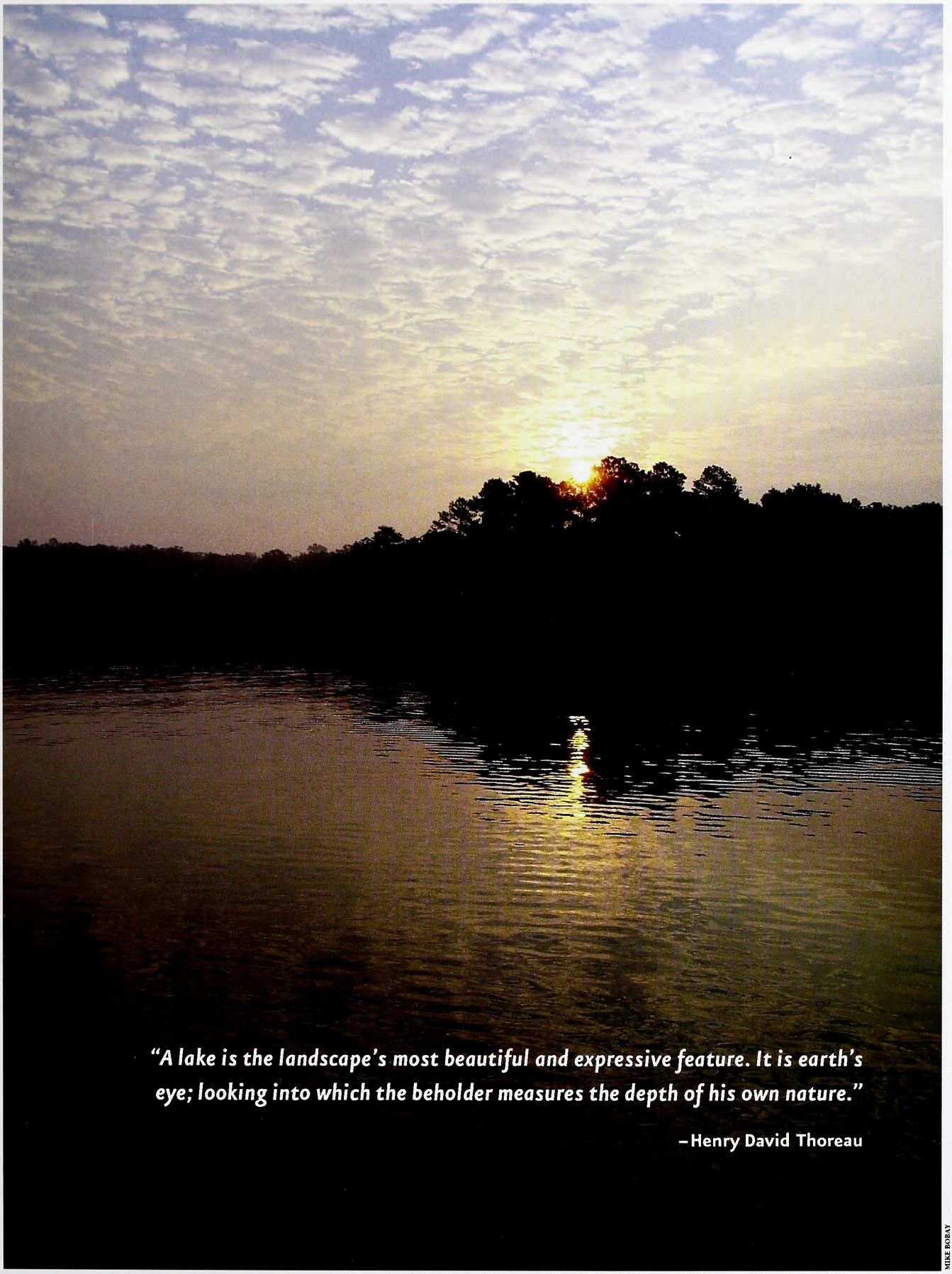
Two years ago on the South Holston tailwater in Tennessee, trout were feeding voraciously, but not on the sulphur duns that were on the water. Finally, I crouched in a seam of current with my folding net. It quickly filled with tiny bluewing spinners that had been virtually undetectable to the eye. A size 20 spinner imitation brought immediate success. A few days later under similarly frustrating circumstances, the net revealed swarms of miniscule ants in the surface film. We live for these obscure revelations. A free pass to Heaven would not bring greater satisfaction, and certainly not if it interrupted fishing.

Thus, it was with great pleasure that I watched my son Scott make a similar trout-bug connection while fishing the famed Henry's Fork of the Snake River in Idaho several years ago. To be honest, he found this water and its technical fishing both frustrating and tedious compared to North Carolina's familiar stair-cased mountain streams where we still do most of our fishing. "It's like learning to play golf on Pinehurst No. 2," he remarked.

Trout were rising, but to what? Finally, he retired to the bank, no doubt wondering why we had traveled 2,000 miles to get our butts kicked by fish. As he sat there, various species of mayflies floated past. He had my bug net, and a book of Western trout flies, so he began to catch some flies and look them up. Then he watched several trout feeding nearby, and it suddenly dawned on him that they were eating only the emerging form of that bug on page 61—a *flavilinea*, also known as a baby green drake. He had such a fly, and he caught the first fish he showed it to.

This success was further enhanced by a day of instruction on a float trip with Lynn Sessions, a former professional bull rider who is perhaps the most respected guide on the river. By the end of the week, Scott was successfully stalking big rainbows on one of the toughest pools on the Railroad Ranch. I watched him catch three exceptional fish one afternoon when no one else within sight—16 fishermen, including his dad—caught anything.

I used to consider portable bug nets a silly affectation, but it's difficult to pick up a floating natural with your fingers, and virtually impossible to snare anything in the surface film or just beneath it. Consider them the perfect accessories to fraud.



MIKE BOBAY

OUTDOOR MOMENT

Harris Lake

IN THE MAY ISSUE

MELISSA McGAW

THE OLD MAN AND THE SHAD

Even more so than blooming dogwoods, the presence of Rudolph Inman on the Cape Fear River signals that it is shad season.

A FLARE FOR FISHING

Neal Conoley's new book tells the tales of the men who built North Carolina's sport fishing industry with their own hands.

A PLAN FOR THE MOUNTAINS

The state Wildlife Action Plan contains a number of projects to protect and preserve highland habitat with help from partners.

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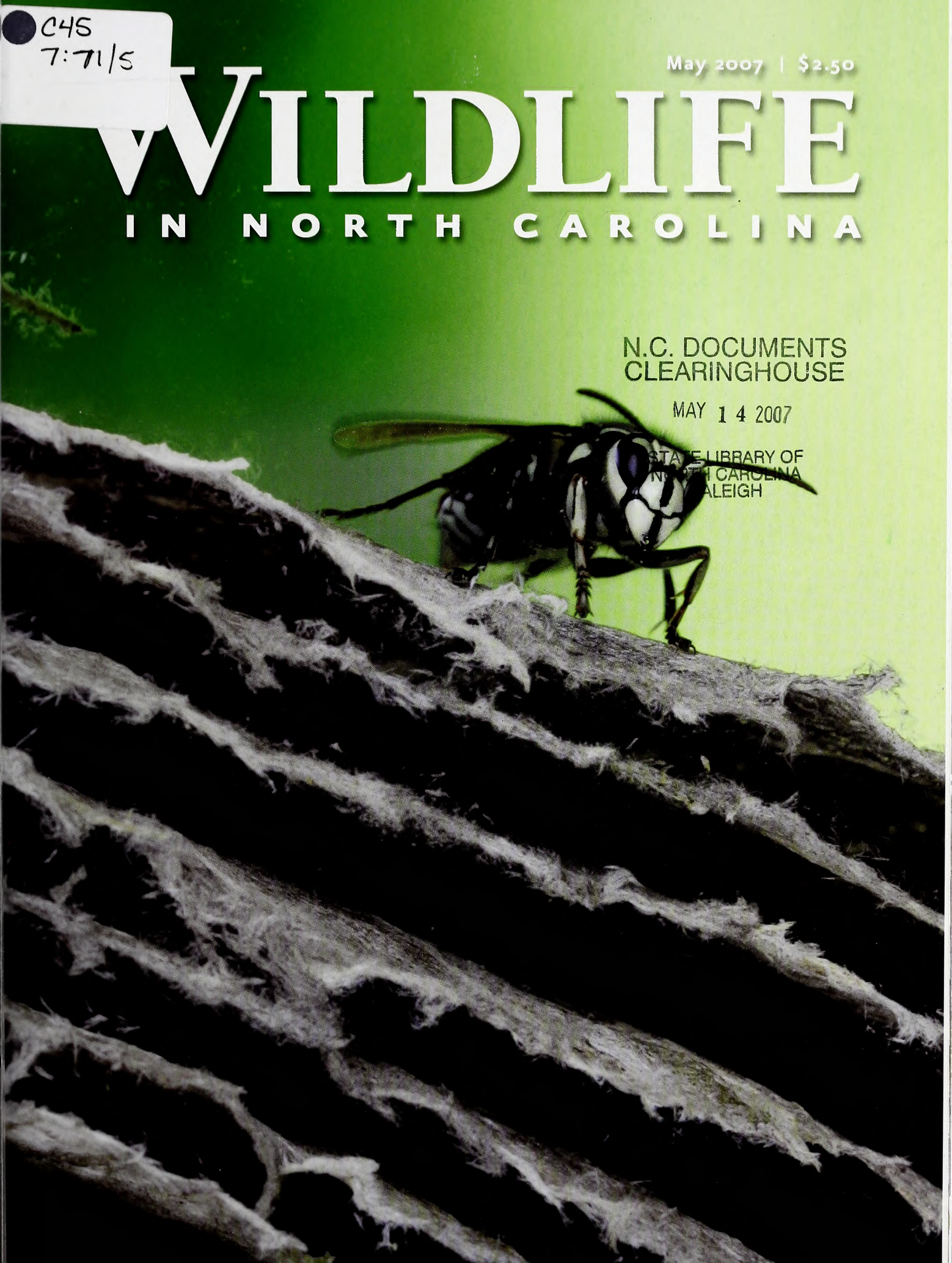

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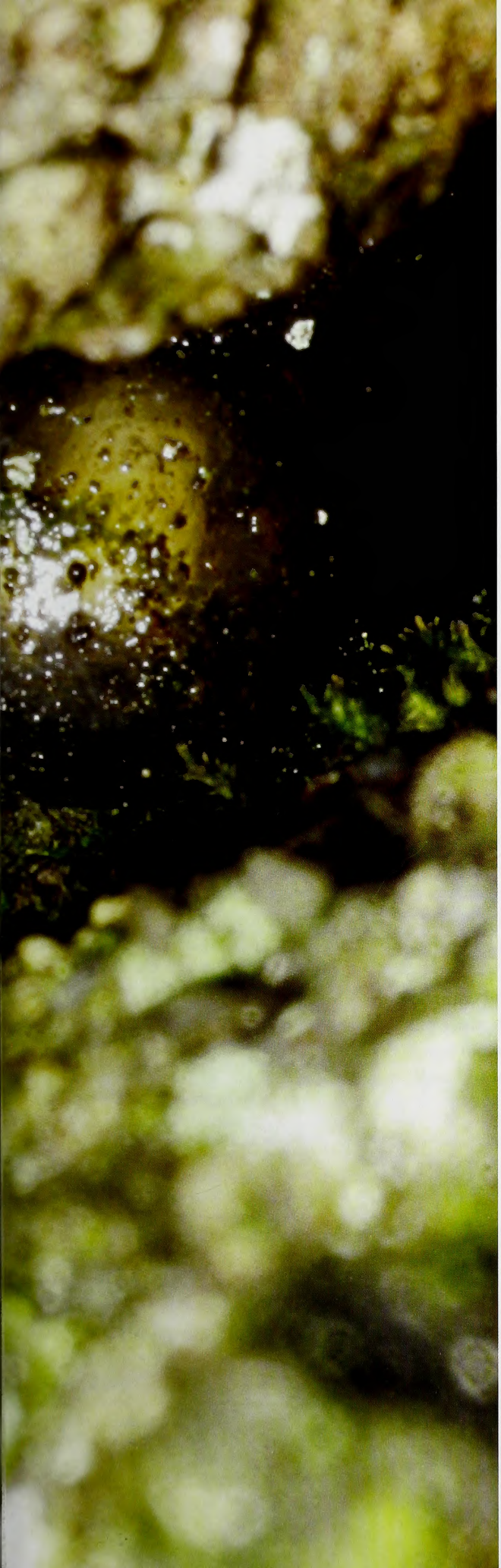
This female green salamander guarding her eggs represents one of the threatened species studied by Wildlife Diversity Program biologists in the mountains. **PHOTOGRAPH BY TODD PUSSER.**



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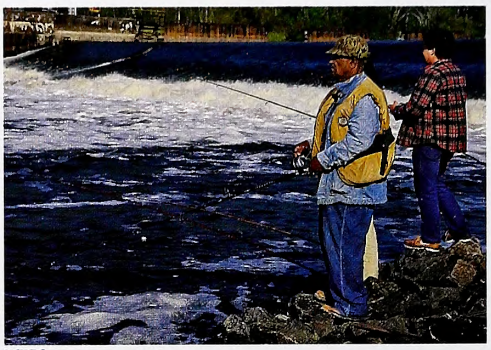
Cover: Sometimes an uneasy and tenuous truce can develop when an animal such as the bald-faced hornet takes up residence near our human homes. **PHOTOGRAPH BY KEN MARTIN.**

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

I really need a new fishing rod. A new pair of hiking boots would be great, too. While I'm at it, maybe I will buy that new tent I was looking at last year. The month of May—when the warm-cool-rainy waltz of spring begins to fade into the relentless fugue of summer heat and humidity—is prime time to gear up and mobilize.

If you like warmth but you can't bear the suffocating heat of midsummer, May is your month. The Roanoke River is roiling with striped bass as the American shad run is ending on the Cape Fear River. "Rudolph's Fish" (page 20) shows what can happen when one person tries a new method of angling. In Rudolph Inman's case, it created a wonderful new angling experience for thousands of North Carolinians.



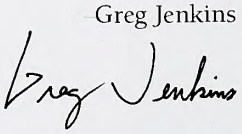
NCWRC

It's a great month to visit the opposite end of the state, too. Consider a scouting trip to Needmore Game Land in Macon and Swain counties, where public land hugs several miles of the Little Tennessee River. The property and the river swarm with wildlife both common and rare, and that's why biologists with the N.C. Wildlife Resources Commission are working to inventory the tract's many species to better preserve and protect them.

"The Thread that Runs So True" (page 10), part of our series about conservation efforts detailed in the state Wildlife Action Plan, discusses the inclusion in 2004 of Needmore into the state game lands program and the work planned for the property. The story also highlights other work being performed in the Mountain region by the Wildlife Commission and its partners.

May is also perfect for deep-sea fishing ("The Fishing Party," page 26) and outdoor target shooting ("Straight Shooters," page 4). Whatever your outdoor pleasure, there's a chance it is more pleasant this month. So take advantage of May before it melts into June. Perhaps you'll see me out fishing by my riverside campsite, new spin caster in hand.

Greg Jenkins



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Small Game, Fond Memories

"The Rabbit Family" in your February issue really touched my heart. The memories that were awakened from my formative years were wonderful. There were four boys in our family and we carried on the tradition just as described in the magazine.

My dad, Geno Newsome, was a rabbit hunter, and he taught my older brothers the sport. My dad died when I was 4, so my brothers taught me. Only one of my brothers is alive now, and at 87 is no longer able to go hunting, but he would love to read the story in your magazine. Please mail a copy of the magazine to him and bill me for the expense. Thank you very much and keep up the good work.

Carter Newsome
Wilmington

Having been raised in Bertie County, I had the privilege and enjoyment of rabbit hunting with neighbor friends when the rabbit population was probably much larger than now, some 60 years later. Reading "The Rabbit Family" brought two, among many, memorable experiences to mind.

One nearby farm family had several beagles and Smut, a larger black dog, that we hunted with. Smut was a "dawg" of unknown, but obviously varied, ancestry who loved to chase rabbits. On one hunt, the dogs' owners took along three beagle puppies to get them a little experience hunting with the older dogs. I was standing in open woods near a field when the dogs jumped and chased a rabbit by me out of range, losing the trail farther on in a honeysuckle thicket. In a few minutes, I heard Smut open up. Back he came with the three puppies in full cry following him on the rabbit's back track. Shortly their barking ceased, and I saw them coming back. As they neared me, Smut stuck his head around from behind a large sweet gum and looked straight at me. If ever a dog grinned, that "dawg" had a grin on his face.

Another time, I was in a swamp bottom as the dogs tried to work out a trail they had lost. They opened up on a track that ran under a downed tree with a trunk about 3 feet off the ground. As the dogs ran under it, I saw a swamp rabbit crouched on the trunk above them. He didn't budge until they were out of sight.

A.P. Mustian Jr.
Winston-Salem

I enjoyed the article on rabbit hunting with the Taylors. I think a valid point was made when Mr. Taylor told of how the family acquired their farm on a government program. However, they had to pay for the land and meet certain requirements, which sounded pretty stringent to me.

Today, the government passes out money with no accountability, and that's about what they get in return. Mr. Taylor and his family built upon the assistance they earned and became a successful family in every way.

Edmond Morrison Sr.
Virginia Beach, Va.

I really enjoyed "The Rabbit Family." My dad grew up hunting rabbits with his dad nearly every Saturday during the season with their pack of five beagles. I enjoy few things more than listening to the stories from those hunts. To me, there's just something special about hearing the sound of beagles off in the distance working a rabbit trail. Coincidently enough, the day before I read the article, I got my first rabbit on our farm using the same pump shotgun Pa-Pa used. I'd like to think that he looked down from Heaven and smiled.

Kevin Almond
Indian Trail

Visionary Tribute

Thank you for the fine article on my dear friend John Pechmann ("A Vision Realized") in the February issue of your great magazine. It was a privilege and an honor for me to serve with John on the N.C. Wildlife Resources Commission from 1995 to 2001. John truly did an outstanding job as chairman of the commission, his hard work illustrating so well his dedication to the wildlife resources of this state. John's wit and engaging personality made him a delight to travel with and to fish with. I believe the naming of the fishing education center at Lake Rim in Fayetteville is a fitting tribute to him and his family. I feel blessed that our trails crossed. I shall never forget him.

J. Robert Gordon, Chairman
N.C. Natural Heritage Trust Fund
Laurinburg

No Sale

In reference to the letter from Mr. Wright concerning "Coastal Tension" (Oct. 2006), very few commercial fishermen will get rich from selling their land. Most do not own a lot of property other than their boats, which are their means of livelihood. A few fish-house owners do have valuable land, but in many cases, they have had the land in their families for generations, making a living from it. Why should they be made to sell it just so somebody richer can build another type of business there, even if it is condominiums?

Jane Wolfe
Jamesville

Correction: Bad Credit

The gorgeous March cover photo of a chinquapin was incorrectly credited. Will Cook, an avid nature photographer from Durham, provided that stellar image. Check out Will's collection of photographs at www.carolinanature.com. The staff of *WINC* regrets the error.

write us

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Whether with rifle, bow or shotgun, Forbush High School hunter safety team members spend countless hours at practice.

STRAIGHT SHOOTERS

WITH HARD WORK AND A BOOST FROM THE COMMUNITY, DAVID MOXLEY AND HIS STUDENTS HAVE CREATED A HUNTER SAFETY DYNASTY AT FORBUSH HIGH SCHOOL.

written by Dan Kibler ★ photographed by Melissa McGaw

BY ALL ACCOUNTS, DAVID MOXLEY is a pretty laid-back guy when his team is competing. There aren't really any sidelines, benches or bleachers at a hunter safety shoot, so you wouldn't expect him to carry a rolled-up program in one hand like John Wooden, nervously chew on a towel like Jerry Tarkanian or slam his visor to the ground like Steve Spurrier.

But Moxley has had every bit of the success that any of those famous coaches have had —or more. Who else can boast of six national titles and nine state championships over the past 16 years?

That's the record that Moxley's Forbush High School hunter safety shooting team has compiled, and at least on the national level, his Falcons are competing against what amounts to all-star teams from other states.

When Forbush won the National Rifle Association's International Youth Hunter Education Challenge last summer in Mansfield, Pa.—leaving the second-place team more than 300 points in arrears—it was the school's second national championship in a row. And the first-place trophy wasn't the only hardware the competitors brought back to the quaint Yadkin County community of East Bend, a town of about 700 people located 17 miles from Winston-Salem.

Forbush's Red team finished first in the senior (high school) division; Forbush Blue took fourth and Forbush White finished eighth. Plus, Forbush Elementary School's Claybusters won the national title in the junior division (sixth through eighth grades) for the second straight year, and the school had a second squad finish fifth.

The word dynasty comes immediately to mind, because Forbush appears to be stocked for years to come. In addition to Forbush Elementary (which has won four national titles and eight state titles in the junior division), Fall Creek Elementary School feeds the high school, and Fall Creek has won four state junior championships and regularly beats Forbush Elementary at the district level. Plus, Courtney Elementary has a junior team and is beginning to feed Forbush with excellent kids who not only can handle a .22 rifle, a bow or a shotgun but also can tell the difference between gray fox and red fox skulls at a glance, use a compass like a Coast Guard helmsman and recite hunter safety rules from memory.

"They've got a superior program," said Tim Lemon, the N.C. Wildlife Resources

Coach David Moxley (far left) assists Jordan Collins in adjusting the sight on his bow. Shooting is just part of the competition, however. Darren Todd (below) sits among some of the accoutrements of a hunter safety tournament.

Commission's hunter safety coordinator for wildlife District 7 in northwest North Carolina. "There's no single reason why, but you see a lot of different things. They've got a real good feeder program—little Forbush, Fall Creek and Courtney are all feeding experienced kids into the high-school program—and they've got real good young 'uns. They're first-class kids that take coaching well, and they really like what they're doing.

"And they get good coaching. David is like the Godfather. When we're in a meeting for coaches or [hunter safety] instructors, if David has something to say, everybody listens."

ANSWERING THE CALL

Moxley himself agreed to listen 25 years ago when the basketball coach at Forbush, Ricky McCollum, asked for help with a hunter safety team he was starting. Like many schools, Forbush was including a hunter safety certification course in its physical education curriculum, and McCollum was the shooting team's first coach. The next year, 1983, McCollum again asked for help from Moxley, a competitive shooter who was the school's drafting teacher. Moxley agreed to pitch in, then McCollum's coaching duties changed—he eventually became the school's athletics director—and Moxley wound up running the program by himself.

"That first year, I think we had five kids," Moxley said. "Yep. I remember. There were six of us in the yearbook photo. I took those five kids to the state shoot in Kinston, and that was it—no parents, nobody else. I drove a school van and we got hotel rooms."

Last July, Forbush High School took three five-man teams to the nationals in Pennsylvania, and Forbush Elementary took two five-man teams. In addition to the 25 students and five required adult leaders, the Forbush entourage totaled well over 100 people—enough that it occupied an entire motel. The school's principal has accompanied the team to the nationals, and the superintendent of the Yadkin County school system went to Pennsylvania last summer—her son was a member of the White team.

> **"They're first-class kids that take coaching well, and they really like what they're doing."**
>
> –Tim Lemon

"When we go to the nationals, so many people can't believe that we all come from one town, from one high school," said Beth Holcomb, whose son, Jordan, was on the national-champion Red team last summer. "The teams from Pennsylvania—they draw from across the whole state. Some of their kids were driving two hours to practice; it was basically an all-star team. And one lady from Missouri, she told me that if it was ever suggested that a school back home have a shooting team—or its own shooting range like we have—there would be no way it would ever happen. Their teams are Future Farmers of America [FFA] shooting clubs or with the Boy Scouts, but not from the schools."

When Forbush headed to the April 28 state tournament that the commission holds at Millstone 4-H Camp near Ellerbe, it was Moxley's last hurrah. With more than 30 years under his belt as a teacher, he's retiring, turning over the drafting tools and computer design programs—and the hunter safety team—to someone else.

"I guess there was probably somebody who could have done a better job than I did, but I was already at the school and I could look out for the kids and file all the paperwork," said Moxley, a soft-spoken, bespectacled man who draws a tiny coaching supplement for putting in countless hours after school from January through August, when the team gets together between three and seven days a week. "The other kids at school, they're proud of the team. There's a sign on the football field, a banner in the gym that has all of our championships on it—just like the other teams. We've got part of a trophy case in the lobby, and our kids get letters like the kids on the other sports teams."

THE COMMUNITY'S TEAM

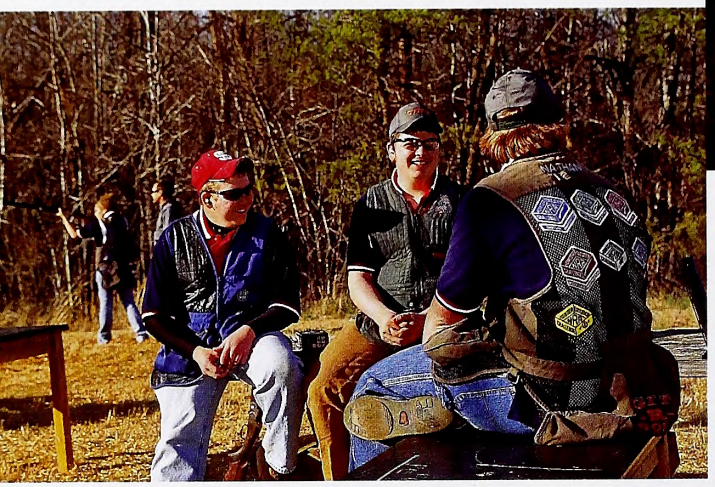
Last year, Moxley juggled an annual budget of around $24,000. The school pays his supplement and gives the team $1,500 through the athletics department budget, and the commission provides $7,500 in funding for the junior and senior division teams that win at the state level, provided they compete at the national tournament. But it doesn't come close to paying all the bills. The rest the team takes care of.

"Last year, I wrote the NRA a $6,000 check for registration fees: $500 for each of the teams and three adults—each team has to have its own coach," said Moxley, whose students raise the rest of their support through a huge chicken barbecue, raffles, auctions and car washes. In years past, when winning teams received firearms as prizes at state and national events, Forbush held onto and raffled off the guns to make money for the following year's team.

"There have been thousands and thousands of chickens sacrificed for that team," joked Tommy Hughes, who has coached the Forbush Elementary team since 1998 and

Moxley gets a shooter's view as Brittany York hones her shotgun skills.

Alysha Wilkins and Jordan Holcomb practice with their compasses for orienteering, while Nick Doub (left to right), Travis Sloan and Nathan McDonald take a break on the range.



> **"When we go to the nationals, so many people can't believe that we all come from one town, from one high school."**
>
> – Beth Holcomb

has sent two sons all the way through the high school program. "We cook between 1,000 and 1,200 chickens the one day we have the barbecue, and we've only had one year when we didn't have a sellout. That was a year when we were scheduled against two or three other big events in the county.

"The support from the eastern part of Yadkin County for the teams has been phenomenal. And all the work brings families together. Parents have to be involved. You don't drop your kids off and leave; it's a family effort," Hughes said. "Being in it is kind of like being bitten by the golf bug; people just love the program and the kids. I've coached everything except soccer, and nothing has grabbed me like this."

Jerry Ratledge, whose son Paul was on the first Forbush team that won a national title in 1990, also sent his twin daughters, Kristen and Kathryn, through the program. He said that it was a perfect fit for a "rural community" and recognized that "all kids don't play ball."

"It has been good for my three kids," said Ratledge, who helped organize the first Forbush Elementary School teams in the late 1980s. "I think about all it's given to the kids and how good it's been for the community, which has really supported it. We've had barbecue chicken suppers and raffles, and we've had people in the community give the team $100, and companies have made donations.

"I helped David for seven years; he's one of the neatest, fairest people with kids I've ever been around. There's no way to know how much time that man has put in."

Moxley's son was a baseball player. He had a daughter on the hunter safety shooting team, but she's been out of school for years. Moxley has kept right on as coach. He typically has 25 to 30 students try out for the high school team every year. They start in January doing the studying necessary to compete in the hunter-skills exam that's given at the district and state competitions. The test includes orienteering, wildlife identification, hunter responsibility and hunter safety questions, and it counts on an equal basis with the three shooting events: .22 rifle, shotgun and archery.

The NRA's national competition adds a muzzleloader event and divides the test into four different components — orienteering, wildlife identification, a hunter responsibility exam and a hunter safety trail — that contribute on a basis equal to the shooting events for the team's overall score.

"A lot of people have a preconceived idea that it's just a bunch of redneck kids shooting guns, but they're surprised when they find out how much bookwork is involved, and the hunter safety training," Moxley said. "When I first started, it was just the three shooting events: shotgun, rifle and archery. In 1990, they added the test to the shooting — it's a combination of orienteering, wildlife identification and the written exam.

"One year in the mid-1990s, at the state shoot, we were first in rifle, shotgun and archery, but we messed up enough on the orienteering part that we finished second overall. That got our attention."

HITTING THE BOOKS

"We started really emphasizing studying for the tests, because everybody will have a bad day shooting every once in a while," Moxley said. "But there is always a bunch of points out there you can get by studying hard and doing well on the exams. The last two years, we've won some of the nonshooting events, and in 2005, we won the written exam by 300 points and were 200 points ahead overall. At the nationals, when we get to those other four events, we've practiced them as much as we have the shooting."

Moxley said that when he took over at Forbush in 1983, he looked up to the two Davidson County teams that dominated the state shoot: Ledford and North Davidson. "I was looking at Ledford saying, 'I want to beat you,'" he admitted. But it wasn't until he took the advice of a wildlife enforcement officer and looked into adding teams at the feeder elementary schools that the high school program really prospered.

"I was very competitive when I shot, and when I got those groups in in 1990, when we were starting to get it, I sat them down and asked them, 'Do you want to go to nationals, or do you want to go and win?' They wanted to win, so they put in the extra time, and that's the way it's been ever since."

The competition within the high school team is intense but friendly, with kids working with each other to improve their weak events. But the practices are high-stakes affairs. "The competition is amazing," Hughes said. "He runs three teams of eight people each, and we've had a kid come into a practice number one in an event and drop down to fifth or sixth."

Hughes' son, Sam, is a perfect example. "He won the state in shotgun one year, and the next year, he didn't get to shoot shotgun at the state," Moxley said. "You can have four kids shoot in each event, and he was fifth. He dropped one target in doubles in tryouts."

That opened the door for Kayla Kite ("The Newest Generation," May 2005), one of a number of female competitors who have excelled in the Forbush program. An outstanding competitor in the Fall Creek program, she took Hughes' spot in shotgun and was the senior division's overall individual champion at the state shoot—then couldn't defend that title the next year because she failed to qualify for all three of the shooting competitions.

"It takes a good mix of kids to have a team like this," Moxley said. "That's what we have now. They're very competitive, and when they're competing among themselves, they're bettering each other, working with each other. It's more of a team effort. At nationals, you've got just five on a team, and the best ones are pushing each other all the time to make sure they stay up there. Really, we took three teams of five to nationals last summer, and we could have mixed them up in any combination—especially the Red and Blue teams—and any five would have been a good team."

A sidelight to all of the trophies and recognition that team members receive is the feeling their parents get when they send them afield in the fall to hunt deer or squirrels or doves.

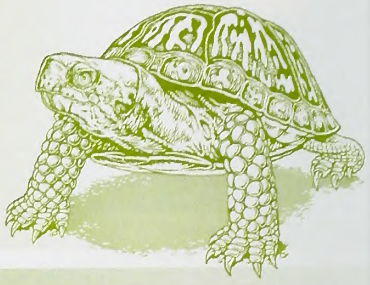
"The program has taught my son a lot of responsibility and firearm safety," Beth Holcomb said. "I don't worry about him going hunting—or even taking his younger brother. You don't have to worry about any of the kids on those teams."◆

Dan Kibler is a freelance writer living in Winston-Salem.

Holcomb (left to right), Hannah Joyce and Caleb Reavis display their trophy caps. After a shotgunner records his first perfect score in practice, his cap is tossed in the air and he fires at it.

The Thread that Runs so True

Wildlife Action Plan KEEP COMMON ANIMALS COMMON



Partnerships help make Wildlife Action Plan conservation activities possible in North Carolina's mountains.

This is the second of a five-part series about North Carolina's Wildlife Action Plan. Each successive story will discuss how the plan is being implemented in a different region, culminating with a final piece about statewide initiatives.

MARCH	INTRODUCTION TO THE PLAN
MAY	MOUNTAIN REGION
JULY	PIEDMONT REGION
SEPTEMBER	COASTAL PLAIN REGION
NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

Jesse Stuart would understand what life is like for people involved in the conservation of nongame wildlife. Stuart's experiences as a teacher in the mountains of Kentucky, detailed in his 1950 book "The Thread That Runs So True," mirror those of the biologists who were involved in the N.C. Wildlife Resources Commission's initial foray into nongame conservation. For a salary of $60 a month, Stuart began teaching a group of more than 30 children ranging in age from 5 years to 20. The Wildlife Commission's nongame program began in 1983 with a handful of biologists responsible for an entire state containing numerous species in need of conservation efforts. Like Stuart, these pioneering biologists had a paltry budget and little knowledge of the current status of their subjects.

Although young and ill-equipped for his first teaching job, Stuart was no fool. Knowing full well the previous teacher had been beaten up by one of the students, he looked for help. He enlisted the protection of a 20-year-old farmer who had walked away from school long before with no desire to return. Stuart convinced the man of the importance of education and how it could help improve the efficiency and productivity of his farm. In doing this, he formed what government agencies like to call a "collaborative effort"—a partnership that solves a problem and benefits all involved.

COLLABORATIVE RESTORATION: "DO THESE THINGS REALLY EXIST?"

It's a question Lori Williams hears every year. Williams is a Mountain region biologist for the Wildlife Commission's nongame group, now called the Wildlife Diversity Program. Although "the question" is usually asked in jest, many of the dedicated volunteers who help Williams have seen only a few bog turtles at a couple of sites that they help manage. Despite the efforts of Williams, a group of dedicated volunteers and various organizations, these secretive little turtles are quite hard to find in their natural habitat. The 3- to 4-inch turtle weighs just 4 ounces and spends most of the year hidden under the sphagnum and

written by JEFF SCHWIERJOHANN *and* STEVE FRALEY

soil of its swampy home. Even when active, the turtles are adept at hiding.

The turtle is known to occur in more than 20 counties in western North Carolina and is listed as one of many priority species in the commission's Wildlife Action Plan (see "Many Creatures, One Plan," March 2007). Williams has developed collaborative efforts to monitor, manage and protect many of the bogs in these counties. One of the threats facing bogs comes not from development, but rather natural succession. In many cases, agricultural practices provide the management necessary to thwart succession and provide habitat for the bog turtle and other listed species. Left to their own devices, many bogs return to forested communities and valuable habitat for these species is lost.

In 2001, the commission, The Nature Conservancy, Project Bog Turtle and the U.S. Fish and Wildlife Service partnered to restore a bog in Henderson County. Natural succession of woody growth had begun to suffocate the bog. A couple of times each year, Williams, other biologists from the conservancy and the Fish and Wildlife Service, and a group of dedicated volunteers turn out to help. They clear woody growth, survey for bog turtles and monitor endangered plant populations. From a small, 20-meter cut done that first year, biologists and volunteers have created several clearings and a conservation plan for the bog.

Although participants are often covered in mud and thoroughly exhausted at the end of the day, Beth Bockoven of The Nature Conservancy notes that everyone enjoys the work. Bockoven and Williams say that the collaborative effort taking place at the bog has been beneficial for the habitat, the species and overall conservation efforts of all the partners.

COLLABORATIVE RESEARCH: HEY, ROCKY!

How do you survey for and conduct research on a small, nocturnal animal that is spooked by the sound of approaching footsteps and can glide 30 meters or more in the forest? Simple: You provide more than 900 nest boxes throughout their known North Carolina range and approach them very quietly during daytime surveys in the winter. Of course, driving, hiking and hauling a ladder on treacherous, snow-covered mountain slopes is not an easy job. This is the task of Wildlife Diversity biologist Chris Kelly, other commission biologists

PEAKS OF DIVERSITY

This is a sampling of the many Wildlife Diversity projects in North Carolina's mountains. Some of these projects are also occurring in numerous other locations.

1. **NORTHERN FLYING SQUIRREL RESEARCH**
   GRANDFATHER MOUNTAIN, AVERY COUNTY
   A COLLABORATIVE EFFORT AIMS TO PROVIDE LONG-TERM AND SUSTAINABLE HABITAT.

2. **BAT RESEARCH**
   CRANBERRY MINE, AVERY COUNTY
   SEVEN BAT SPECIES ARE NAMED ON NORTH CAROLINA'S PROTECTED SPECIES LIST.

3. **MUSSEL (GREEN FLOATER) RESEARCH**
   WATAUGA RIVER, WATAUGA COUNTY
   ASSESSMENT OF THE STATUS OF FRESHWATER MUSSELS REQUIRES COOPERATION AND HELP FROM MANY SOURCES.

4. **BOG TURTLE RESEARCH**
   WILKES COUNTY
   NATURAL HABITAT SUCCESSION IS ONE OF THE THREATS FACING THE TINY BOG TURTLE.

and many partners trying to learn more about the Carolina Northern flying squirrel. Unlike its more common cousin, the Southern flying squirrel, the endangered Carolina Northern flying squirrel is found at higher elevations in some western North Carolina counties.

Even more difficult than checking all of the nest boxes is trying to determine just how endangered this animal is and how best to manage for its continued existence. Kelly heads up the Carolina Northern flying squirrel project for the Wildlife Commission and has formed collaborative and data-sharing efforts with several agencies to address this problem. Biologists from the U.S. Forest Service, the National Park Service, various universities, Grandfather Mountain and other organizations are participants in this effort.

One project that may shed some light on the problem deals with an isolated population of Carolina Northern flying squirrels in the Unicoi Mountains. This population is facing many threats. Loss of conifers due to the wooly hemlock adelgid (see "The Fight to Save Hemlocks," Nov. 2004) may lead to encroachment of the creature's habitat by mast-producing hardwood trees and Southern flying squirrels. This encroachment could lead to added pressures on an already stressed population, and potentially to its ultimate demise. Previous research has also shown that a roadway through the mountains serves as an effective barrier to squirrel dispersal, further isolating the population.

In an effort to alleviate some of these pressures, the Wildlife Commission is collaborating with the U.S. Forest Service, the Fish and Wildlife Service, the Park Service, the N.C. Department of Transportation (NCDOT), the N.C. Division of Forest Resources and N.C. State University (NCSU). The Forest Service is looking into ways to provide long-term, sustainable habitat for Carolina Northern flying squirrels. Conifer seeds to supplement this habitat were collected in the Great Smoky Mountains and are being processed and started by the N.C. Division of Forest Resources. The road issue is being addressed through a collaborative research project with the Wildlife Commission, NCSU and the NCDOT.

Carolina Northern flying squirrels captured during surveys by the commission will be fitted with a radio tracking device. Research conducted by commission and university biologists will help determine what habitats the squirrel is using and where to place potential crossing structures along the road. NCDOT engineers will work to ensure that placement of the structures does not inhibit traffic flow or cause hazards.

No single agency could provide the resources for such a comprehensive study. By forming this collaborative effort, the Wildlife Commission and its partners are taking positive steps in addressing priorities set out in the Wildlife Action Plan in an effective and efficient manner. Data collected from this project will ultimately direct conservation

NEEDMORE: A RARE CONSERVATION OPPORTUNITY, A COLLABORATIVE SUCCESS

For tens of thousands of years, long before humans first arrived on this continent, the Little Tennessee River flowed free and clear from what is now north Georgia through western North Carolina and Tennessee to its confluence with the Tennessee River. Modern human needs for hydroelectric power, flood control and economic development drove the building of dams to harness the river. In less time than the average human lifespan, all but relatively short sections of the Little Tennessee and its major tributaries were dammed and the ancient rivers were replaced by large, deep lakes.

Even stretches downstream from dams that weren't impounded (such as the Cheoah, Nantahala and upper Tuckasegee rivers) were altered by cold water releases, low dissolved oxygen or inconsistent releases of water from dams. Pollution from industry and sediment from erosion further degraded habitats in the Tuckasegee and the upper Little Tennessee rivers.

The Needmore tract is a 4,467-acre property surrounding a substantial portion of the remaining free-flowing miles of the Little Tennessee and its tributaries. Needmore contains critical aquatic habitats, but it also holds significant amounts of mixed deciduous and pine forests, riparian and floodplain habitats, and wetlands. Its acquisition by the Wildlife Commission will ensure future protection of that portion of the Little Tennessee between Lake Emory in Macon County and the upper pool levels of Fontana Lake in Swain County.

The river flowing freely through Needmore supports an incredible diversity of life, including four federally listed species and 12 state-listed species.

continued on page 15

JONATHAN MAYS

FOUR-TOED SALAMANDER
(*Hemidactylum scutatum*)

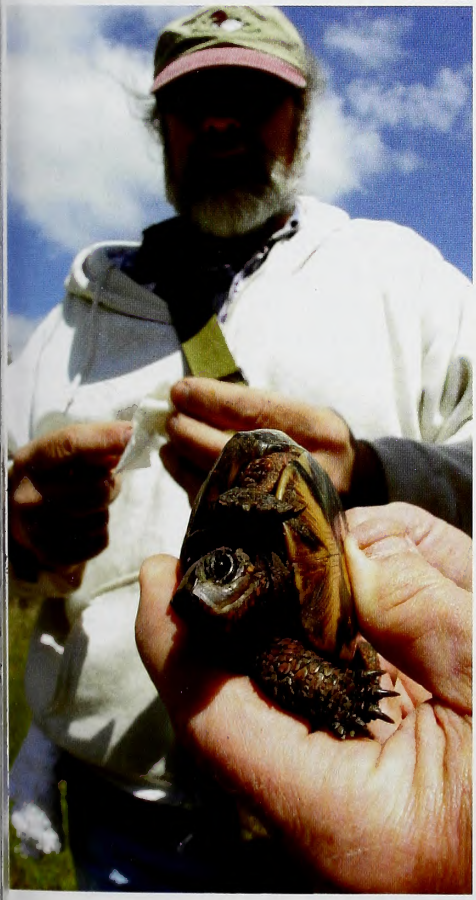
Accurate measurement of foot length (above right) helps differentiate between flying squirrel species. The reclusive bog turtle (right) spends much of the time hidden in the soil and sphagnum of its habitat.

JONATHAN MAYS

CAROL PRICE

We have accomplished much, but are always aware of, and address the bully at the back of the class—funding. *Without* dependable long-term *funding*, all the planning and *conservation efforts* currently being pursued *are in jeopardy.*

TODD PUSSER



TODD PUSSER

efforts for the Carolina Northern flying squirrel in the Unicois and could provide invaluable techniques and partnerships directing conservation efforts throughout the squirrel's range.

COLLABORATIVE CONSERVATION: GOING BATTY

There are seven species of bats on North Carolina's protected species list. Conservation of these species and their habitats are also priorities discussed in the Wildlife Action Plan. Many people have a problem getting past the urban legends and negative press that bats often get. However, once you learn about the animals and see them in action, it's hard not to be impressed by them. The only true flying mammal (flying squirrels glide), bats can be found in just about every habitat around the world except arctic climates. They serve important roles from pest control to pollination everywhere they occur.

Scott Bosworth heads up Mountain region bat projects for the Wildlife Commission. He spends a lot of time in caves and mines, under bridges and in streams at all times of the day and night to learn more about these creatures and how to direct conservation efforts. With so many species and so much ground to cover, the commission has reached out to state and federal agencies, nonprofit organizations, universities and the general public to create partnerships that will benefit the priority species and their habitats.

The Virginia big-eared bat and its relative, the Rafinesque's big-eared bat, are both listed species of special interest to the Wildlife Commission. Collaborative efforts with the Park Service and private industry have led to the protection of two important roost sites for the Virginia big-eared bat. Both sites are surveyed to monitor population numbers.

Use of abandoned buildings for summer roosts is a common strategy employed by the Rafinesque's big-eared bat. Once found, these sites make monitoring of populations easier as the bats return to the same roosts year after year. However, when such a roost is lost, monitoring is contingent upon finding the new roost. Just such a scenario unfolded for biologists when a building serving as a roost for Rafinesque's big-eared bats in Haywood County was destroyed. Follow-up mist net surveys (catching the bats in nets during nighttime foraging) determined that the colony was still in the area. However, limited resources prevented a thorough survey to find the roost. The commission is working with the Forest Service to provide a new artificial roost for the bats that will allow for effective and efficient long-term monitoring of the colony.

The endangered gray bat is another species targeted for research this year. Gray bats use caves as roosts year-round and spend most of their time foraging long distance over streams and rivers. Gray bats have been captured on the Pigeon River along the Tennessee and North Carolina border, so research and conservation efforts for this species will likely require the collaboration of organizations across political boundaries and must focus on watershed-level conservation strategies.

Below, biologist Jeff Schwierjohann examines a common Eastern pipistrelle. Opposite page: The *Cambarus (J.) asperimanus* crayfish is found throughout the Mountains.

MELISSA McGAW

COLLABORATIVE MONITORING: WET & WILD

Western North Carolina is blessed with an abundance of fresh water. Fed by what is among the highest average annual precipitation in the country, water seems to run from every nook and cranny in the mountains. An abundance and variety of aquatic habitats—from cold mountain headwaters to big, warm rivers—and the relative isolation of these river systems on each side of the Eastern Continental Divide result in a historically rich diversity of aquatic life. The variety of aquatic life in western North Carolina, especially fish and crayfish, is exceptional. Many of the species are found nowhere else in the world. Some have been lost already, others are in serious trouble, some are holding their own, and a few may be making a comeback.

The basis for all conservation action and the measure of its success is the status of the animals: Are populations declining, stable or increasing? The Wildlife Commission determines this the old-fashioned way—by getting out and looking for them repeatedly to assess population trends over time. In the recent Wildlife Action Plan, 85 aquatic species were identified as priorities for conservation in the Mountain region. That means the status of all these animals should be monitored and reassessed about every five years. Even this basic task would be impossible without cooperation and assistance from many partners.

Assisting fish and crayfish monitoring in the region are the N.C. Division of Water Quality, the Tennessee Valley Authority and the Little Tennessee Watershed Association. All three monitor aquatic communities at sites around the region as indicators of water quality (a process called bioassessment). The commission's Habitat Conservation Program biologists plan monitoring surveys around their work to fill spatial gaps or to search for certain species when special techniques or more thorough surveys are required. Colleagues in the commission's Division of Inland Fisheries monitor game fish populations

STEVE FRALEY

STONECAT
(*Notrus flavus*)

continued from page 12

These include the only North Carolina population of the federally threatened minnow, spotfin chub (*Erimonax monachus*), and one of only a handful of populations of the federally endangered mussels Appalachian elktoe (*Alasmidonta raveneliana*) and littlewing pearlymussel (*Pegias fabula*). In all, 24 of the 85 conservation priority species in the region are found there. Its importance to the aquatic fauna of North Carolina is unparalleled.

In addition to numerous aquatic species, the Needmore tract also contains abundant game populations of deer, turkeys, bears, raccoons and ruffed grouse. The wetland and bottomland habitats provide important habitats for woodcocks, and many waterfowl species are found on the river during migration.

Needmore supports habitat for rare or threatened terrestrial creatures such as the bog turtle (*Clemmys muhlenbergii*), the four-toed salamander (*Hemidactylum scutatum*), the hellbender (*Cryptobranchus alleganiensis*), the Eastern small-footed bat (*Myotis leibii*), the pygmy shrew (*Sorex hoyi*) and the southern Appalachian wood rat (*Neotoma floridana haematoreia*). With the help of partners, the commission plans to survey them to determine if they do occur there.

Ironically, a legacy of the dam-building days offered the opportunity to help conserve this precious "egg basket" of biodiversity. Nantahala Power and Light once owned the Needmore tract and planned to build a dam and reservoir there. Duke Energy acquired the land, but with no plans to build a dam considered selling the land for development. This proposal spurred action by a number of parties, culminating in one of the most successful examples in the Mountain region of a partnership to effect conservation.

A diverse group came together to purchase and protect Needmore. The local citizens' groups Land Trust for the Little Tennessee, Friends of Needmore and the Little Tennessee Watershed Association were joined by The Nature Conservancy, N.C. Ecosystem Enhancement Program, Clean Water Management Trust Fund, U.S. Fish and Wildlife Service, N.C. Natural Heritage Trust Fund, Wildlife Commission, National Wild Turkey Federation and other private groups and individuals. Each group contributed funds and worked together to purchase the tract.

In January 2004, the purchase was completed and management of the property was entrusted to the Wildlife Commission as the Needmore Game Land. Shorelines, floodplains and a portion of the watershed along 13 miles of the Little Tennessee River and 37 miles of tributary streams are now protected and serve as a core of watershed and wildlife habitat conservation.

–Steve Fraley

and often share data and work together in the field with Aquatic Wildlife Diversity biologists toward common objectives.

A vital partner in most aquatic habitat conservation work, including monitoring, is the U.S. Fish and Wildlife Service. Major portions of federal funding come through them, but the service also helps monitor federally listed and other rare mussel species. The commission also works frequently with the NCDOT to survey mussels where agency interests overlap, often assessing or avoiding impacts from bridge or other highway construction. Other cooperators providing monitoring assistance and survey data include the U.S. Forest Service, the N.C. Natural Heritage Program, energy companies and colleges and universities.

Managing such monitoring data is also a big job and there is help with that, too. The Natural Heritage Program assembles information from many sources and makes it available to the commission and others. The N.C. Museum of Natural Sciences provides data from their collecting, as well as from all specimens deposited there by others.

Despite having a good partner, Jesse Stuart still had to fight his bully. However, he was successful throughout his career by always keeping the students' education in focus, always advocating the importance of education to the future, and by always leading by example. The Wildlife Commission has partnered with more than 100 organizations and has enlisted the help of hundreds of volunteers.

We have accomplished much, but are always aware of, and address the bully at the back of the class — funding. Without dependable long-term funding, all the planning and conservation efforts currently being pursued are in jeopardy. As such, we will continue to keep the conservation of North Carolina's natural heritage in focus, by educating the public, advocating its importance and leading the way with innovative conservation techniques and strategies. For the Wildlife Commission, that is the thread that runs so true. ◆

JONATHAN MAYS

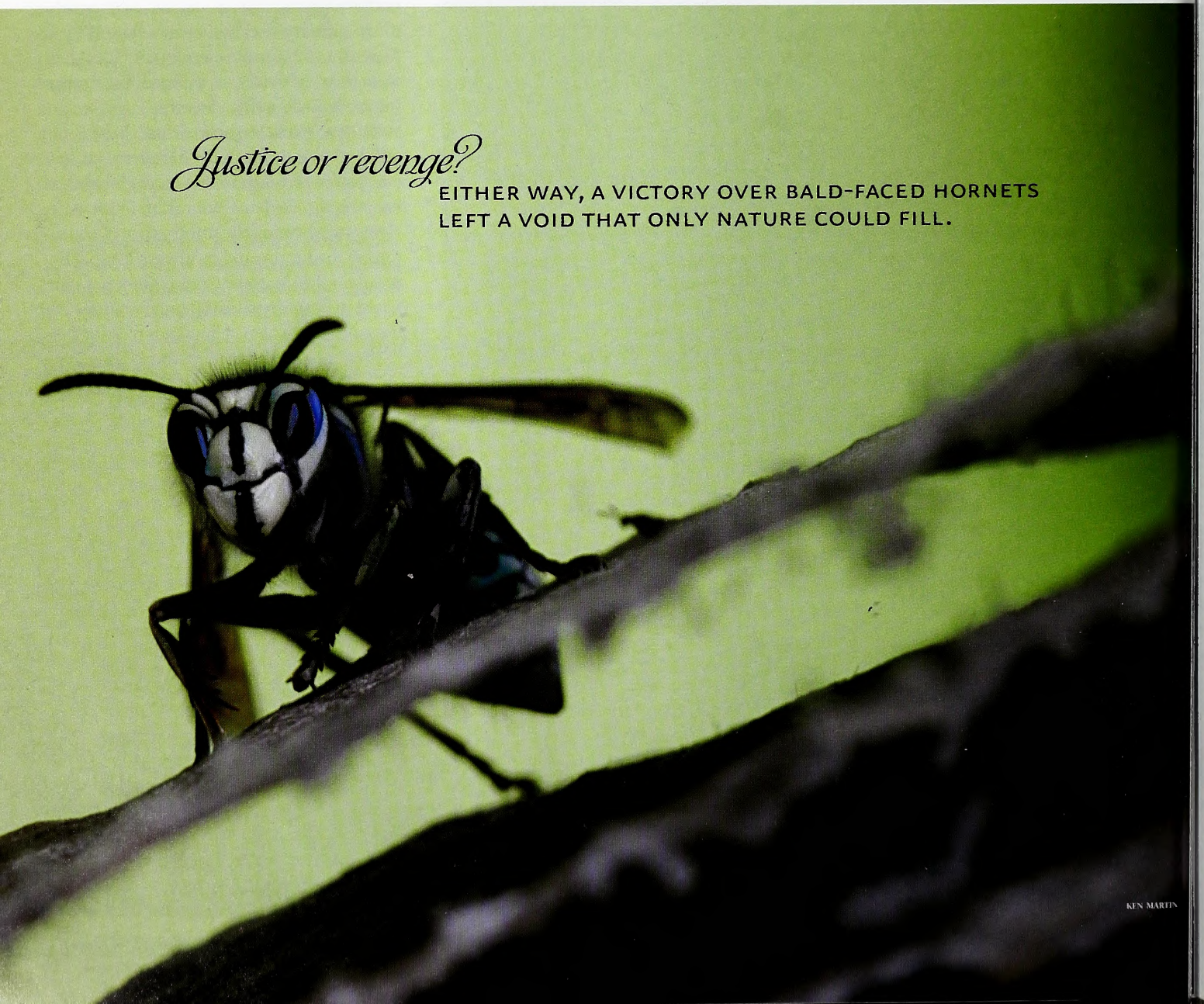
Jeff Schwierjohann and Steve Fraley lead the Mountain region Wildlife Diversity Program in the NCWRC's divisions of Wildlife Management and Inland Fisheries, respectively.

The Empty Nest

Written by T. Edward Nickens

Justice or revenge?

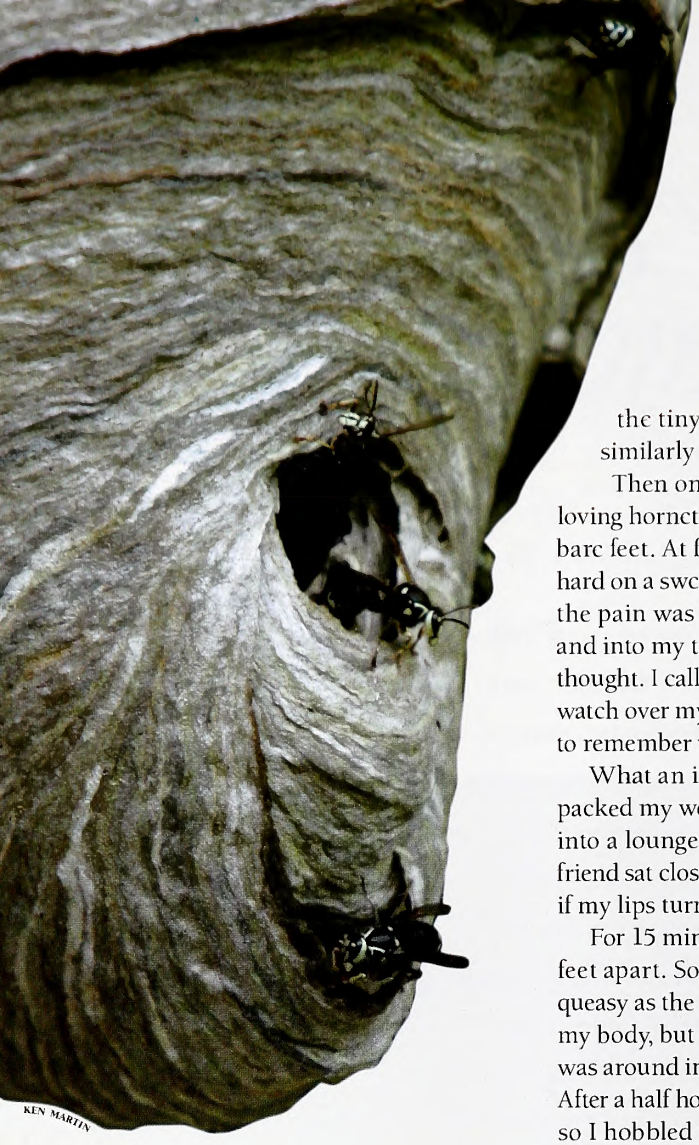
EITHER WAY, A VICTORY OVER BALD-FACED HORNETS LEFT A VOID THAT ONLY NATURE COULD FILL.



KEN MARTIN

I WAS WASHING DISHES WHEN I SAW THE NEST FOR THE FIRST TIME. I SWEAR IT WAS MERELY THE SIZE OF A PING PONG BALL, A HALF HANDFUL OF WOOD AND SALIVA TUCKED NEATLY INTO A CORNER OF THE KITCHEN WINDOW AWNING. A SQUADRON OF BALD-FACED HORNETS BUZZED THE GRAY CLUTCH, AN ORB THAT DANGLED FROM A THIN STEM LIKE THE LAST LEAF OF WINTER ON A WHITE OAK BRANCH. I INSTANTLY RECOILED, SQUEEGEE IN HAND. I AM MORE THAN MILDLY ALLERGIC TO INSECT STINGS, BITES, NIPS, NIBBLES AND GNAWINGS. THE SMALLEST MOSQUITO CAN RAISE HALF-DOLLAR SIZED WELTS. MY LAST BEE STING PUT ME ON CRUTCHES FOR TWO WEEKS.

I WAS, THEREFORE, UNIMPRESSED WITH MY NEW NEIGHBORS.



KEN MARTIN

The next time I looked — IT SEEMED LIKE ONLY A DAY OR TWO LATER — THE NEST HAD EXPLODED IN SIZE. NOW IT WAS TWICE AS LARGE AS A BASKETBALL, A HUGE GRAY HEART HUMMING WITH HIDDEN LIFE.

Still, I watched the little buggers with an intensity afforded by my glassed-in cocoon. No problem, I thought. I'm a natural kind of guy. "You stay on your turf," I said through the window to the hornets, white-faced and black as hate, "and I'll stay on mine."

The next time I looked — it seemed like only a day or two later — the nest had exploded in size. Now it was twice as large as a basketball, a huge gray heart humming with hidden life. Suddenly a layer of glass didn't seem boundary enough. I considered taking the offensive — brandishing the garden hose, perhaps, or renting a flamethrower from the National Guard — but I'd struck a Vespidaen bargain with these arthropods, and I wouldn't go back on my word. *Stay off my body,* I warned anew, *and I won't wage chemical warfare.*

For weeks our testy alliance worked. I'd wash the dishes and watch the winged tigers come and go by the dozens, an unceasing stream. Once a single warrior wedged itself between the glass and screen and died there. This was an evil portent, I thought, so I left the tiny corpse as a warning to other similarly bold bugs.

Then one day I stepped on a sun-loving hornet while mowing the lawn in my bare feet. At first I thought I'd come down hard on a sweetgum ball, but within seconds the pain was streaking through my calf and into my thigh. I've really done it now, I thought. I called a nearby friend to come keep watch over my respiratory system, and I tried to remember where I'd stashed the crutches.

What an idiot, mowing in bare feet! I packed my wounded hoof in ice and settled into a lounge chair on the front porch. My friend sat close by, ready to scream or dial 911 if my lips turned blue.

For 15 minutes we dawdled there, not 10 feet apart. So far, so good. I began to feel queasy as the hornet's toxins seeped through my body, but I was comforted that someone was around in case my esophagus collapsed. After a half hour I thought danger had passed, so I hobbled into the bathroom for a Dixie cup of water.

I looked into the mirror. A red splotch was crawling up my neck like a continent adrift. My right eye was swelling, and in that closing orifice floated a bloodied eyeball. But I could handle all that; what really scared me was the size of my neck, fat as a buck's in full rut. I tried to yell, but my larynx refused to vibrate. Remembering an old *M*A*S*H* episode, I groped for a pen on my way to the door, visions of a Bic Click stuck into my throat in a vain attempt at a self-tracheotomy. I stumbled onto the porch and hurled a gargled curse at my would-be protector.

A half hour later I lay on a paper-wrapped examination table, a hit of Benadryl working its way through my veins. I'd better upgrade the quality of my friends, I thought. And before the day was out, I vowed, I would send those hornets to hymenopteran hell.

Revenge came with the trademark name of the Enforcer. Guaranteed to fire pyrethrins and technical piperonyl butoxide ethers a full 20 feet, the 20 ounces of Everyman's napalm could melt the heart of any winged and segmented creature. I was completely baffled at its efficiency: when I doused the nest, dozens of hornets fell in a single clump, followed by a dripping of bodies that lasted for nearly five minutes. It was a gory sight, a sickening spectacle of man's modern dominion over the beasts of the earth.

GUILT SETS IN

Now a silent peace ruled my urban habitat, an ease that soon wore like a hollow victory. Each day from the kitchen window I looked upon the empty gray nest, silent and lifeless like a forgotten horn that no child ever blew. I felt a certain sadness for all my established dominion. After all, I was the intruder; in a scheme of things grander than that which says a man must keep a tidy lawn, it was the bald-faced hornets that existed in the natural order. They were only doing what a million years of instinct bid them.

So now a sense of loss replaced the fear I had when I stared out the kitchen window. Having claimed such chemical sovereignty over my Raleigh abode, I felt a strange sort of detachment from the natural environment, a kink in a lifeline I had treasured and a relationship nurtured on a daily basis. Was I so much higher on the evolutionary ladder that I'd lost sight of the bottom rungs my own ancestors had climbed? Silent in the ivy, on the ground right under the nest, was a pile of dead bodies, my private Salem's Lot.

A few weeks later I heard chirping at the kitchen window. Intrigued, I stalked across the linoleum, bent low to hide my approach behind the sink and cabinets. There was a Carolina wren with a beak full of the hornets' nest. It flitted away and then immediately returned, disappeared within the gray ventricle, then reappeared again. The wren was creating a hollow in the nest! I stood up, and the wren cast a wary glance my way, but only for an instant. The bird accepted my presence; in a few moments another appeared — this one bearing pine needles in its beak — and the two wrens flew into the nest through an opening they'd made just below the awning.

For weeks those birds toiled, resting on the edge of the nest during the early summer thunderstorms, dry as kindling there under the awning. Once, a vicious twittering—insofar as twittering can be vicious—brought me running to the kitchen. The two wrens were poised on the edge of the sash, hissing, heads hunkered down like cornered dogs. A few yards away two Carolina chickadees perched on a branch of the sweetgum tree, black-hooded like executioners. The chickadees flitted menacingly—insofar as flitting chickadees can be menacing—from branch to branch and then without warning launched themselves toward the wrens and the coveted nest. The territorial battle was fierce, if miniature in scope. I watched, glued to the scene, until the wrens finally drove their attackers away.

GARY D. ALPERT

REDEMPTION

A week or two later, or the next time I washed dishes, I discovered why the wrens had so valiantly defended their home. Perched on the rim of the nest in a nest was a fat chick, downy brown and just beginning to fledge. That meant the chick was at least two weeks old, for passerines are altricial—that is, their young are born naked and helpless and require intensive parental care. The eggs had likely already been laid—perhaps hatched—when the chickadees declared their 15-minute war. No doubt the wrens fought doubly hard to defend their nest.

Now this was a heartening turn of events—from life to death and back again. The parent birds would return to the nest with flies and ants and spiders and such, dinner and lunch gleaned from the ground and the bark of trees, and I would wash my dishes. Once I came home to find a chick on the front porch. When I approached, it flew to the top of the railing and stopped there, afraid, it seemed, to venture higher. I stepped closer and the bird took off with a halting, looping flight to the trees and beyond.

Good luck, I wished inside my head. *What with cats and crows—and chemicals—you'll need it.*

So spring rolled straightaway to summer, and summer to fall, and fall to winter, and I never saw those chicks again. I couldn't say if they lived or died. The hornets' nest loosened and fell from the awning sometime around Christmas; one day it was there, the next it was gone.

There, to my amazement, WAS A CAROLINA WREN WITH A BEAK FULL OF THE HORNETS' NEST. IT FLITTED AWAY AND THEN IMMEDIATELY RETURNED, DISAPPEARED WITHIN THE GRAY VENTRICLE, THEN REAPPEARED AGAIN. THE WREN WAS CREATING A HOLLOW IN THE NEST!

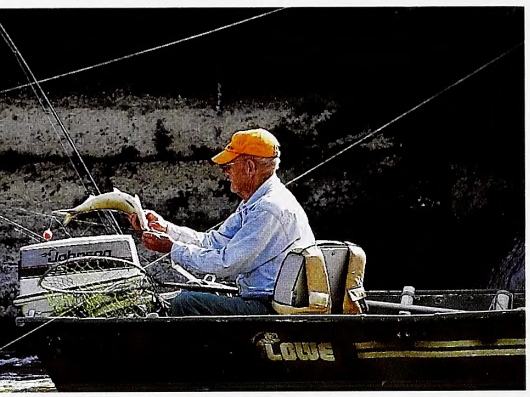
In its place I put up two bird feeders and settled in for a winter of watching as the birds passed through on their migrations or stopped to winter. One day I poked around the ivy for remnants of the nest, and sure enough, a piece the size of a dinner plate still remained. I retrieved two layers, like floors in a department store, on top of which sat the wrens' contraption of a nest—pine needles, leaf debris and black plastic. Among the ivy lay a few hornet bodies, a scattered thorax or two that had not yet gone to some kind of biological dust. I took the nest inside and placed it on a shelf near the kitchen window.

That afternoon a Carolina wren found its way to one of the feeders. I thought for a moment that it glanced up at the ribbons of hornets' nest still clinging to the awning, but perhaps I was only hoping it would. The little bird picked out a seed and turned an eye my way. "You're right," I muttered through the glass. "It needs a little work, but I'll bet you could pick it up for a song." ◆

NCWRC

T. Edward Nickens is an editor-at-large for Field & Stream *and a regular contributor to* WINC.

Rudolph's fish



The author learned that if Rudolph Inman's boat and trailer are not behind his house, you can be sure the American shad are back. When they are, he can be found fishing for them below the locks.

Once water temperatures reach about 54 degrees Fahrenheit, the spring migrations of American shad begin. And, not having the explosive nature of most vernal events, the shad migration is quite protracted. By the time river water temperatures reach 60 to 64 degrees, the migration is at its peak. For those who cannot be bothered with sticking thermometers in rivers, there are other signs the shad are running. In Maryland I knew that the arrival of spawning shad was more or less timed to coincide with the blooming of the shadbush, a plant originally named by people in tune with the out-of-doors. But there are slight variations in the theme as spring progresses northward at different speeds, and along the Atlantic Coast not everything is on the same schedule. In southeastern North Carolina when the dogwoods peak and the swallows return, the shad runs are at full throttle. Though the peak comes more or less in mid-April, our regional spawning run of American shad extends from mid-March through mid-May.

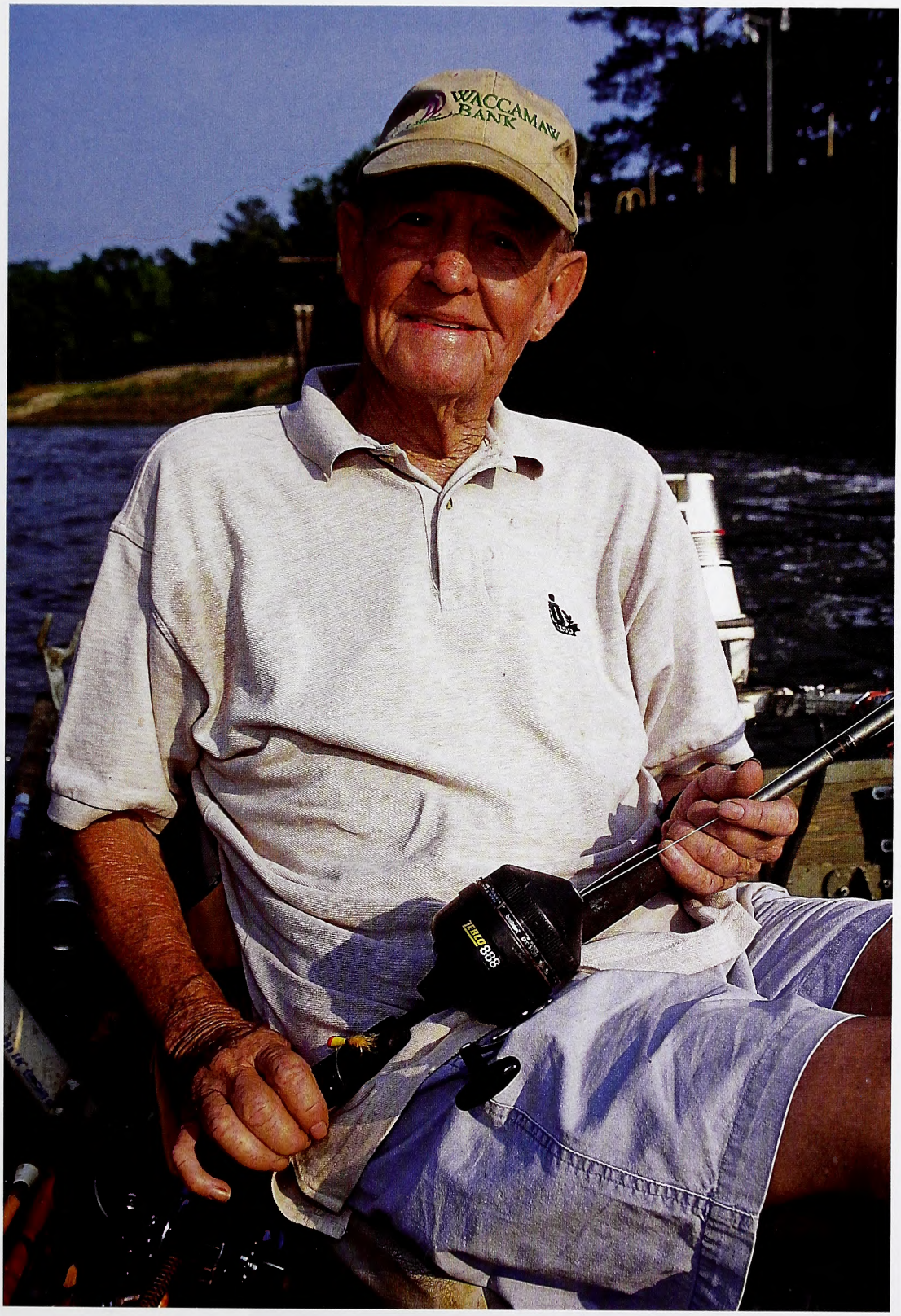
Since I wanted to experience the totality of our local shad run, I needed a reliable indicator to inform me about when it started. With a little asking, I found one. My wife's cousin told me, "If Rudolph Inman's boat and trailer are not behind his house, the shad are back. You'll find him fishing below the locks." Sure enough, he was out there every day, fishing from the first of March through the first week of May. And if looking for his boat is not enough of a sign, on evenings during peak season his yard fills with curious people waiting to see what he has caught that day.

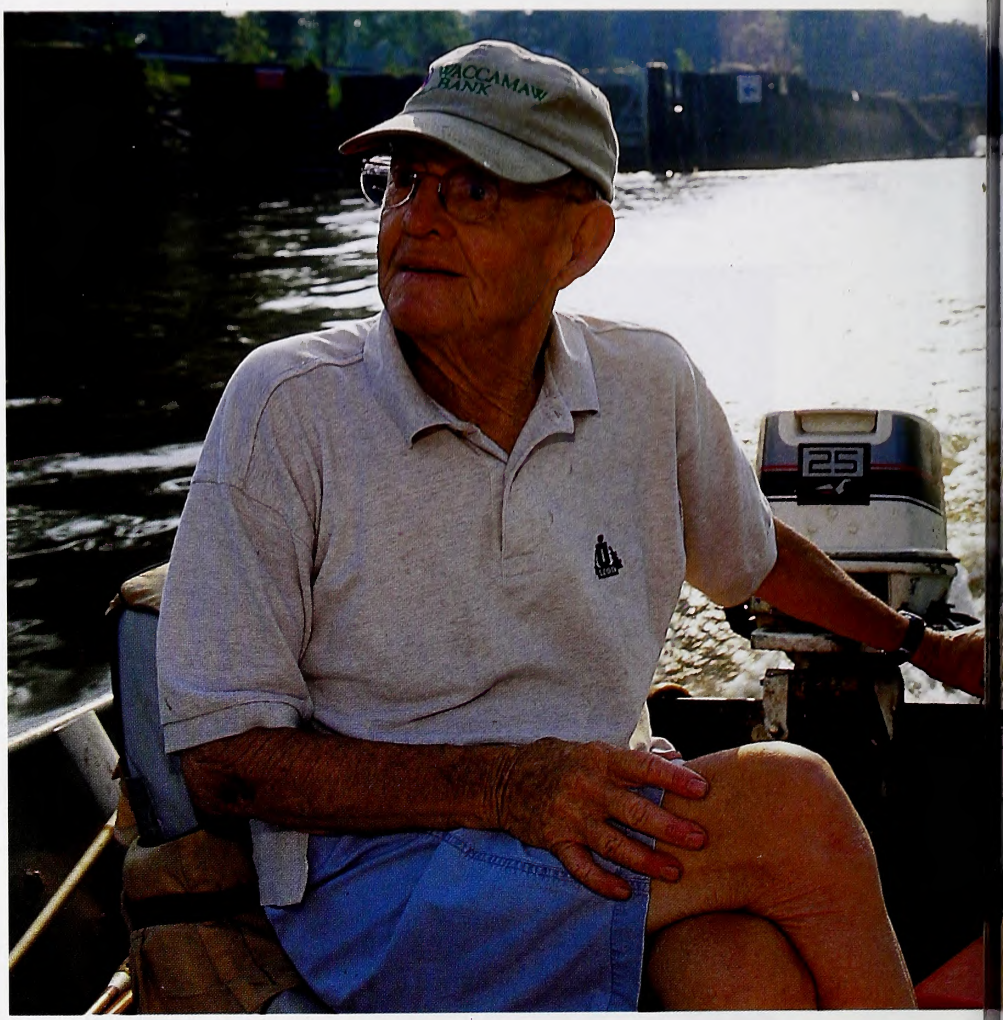
So last spring I found myself accompanying Rudolph on a number of his fishing ventures on the Cape Fear River. If I were to learn about shad, it might as well be from a person with experience. At 80-something, Rudolph has experience. Wishing to tag along, I would inquire as to when he was going. After a few days of this, I figured it out—he went pretty much every day. While Rudolph worked the lines and fish, I worked Rudolph for fish stories.

Rudolph, it seems, led the way for shad to become a sport fish in North Carolina. In the 1950s, while he was fishing for shad commercially with nets in the lower Cape Fear, he continually heard stories of people catching shad on rods and

written by David S. Lee photographed by Melissa McGaw

When the author wanted to learn about American shad fishing, he went to the source. Pioneering shad angler Rudolph Inman has volumes to tell us about the historically important fish.





reels in Florida's St. John's River. On a whim he gave a friend heading to Florida five dollars and asked him to buy some of whatever it was that they were using to hook the fish. His friend later returned with a box of assorted shad darts. The next spring Rudolph gave 'em a try, and he has been catching shad on lines ever since. What makes the story interesting is that shad do not go after baited hooks. They are plankton feeders and during their spawning runs probably don't even attempt to feed. So why do they get hooked on darts? They probably just see the darts as an annoyance and nip at them.

The fishing stories from Rudolph were endless, and many were not standard-issue big-fish tales. He told me one from a few seasons back about someone who borrowed a friend's boat. The man had all of his poles rigged for shad and, in the excitement of the day, shoved off before he fired up the outboard. Well, the motor wouldn't crank, and the spring currents soon carried everything over the dam. Rudolph pointed to the spot where the boat was greeted by the rock dam. There was not much left of the borrowed boat and motor or the fisherman's pride. Later last spring I was chatting with a wildlife officer while Rudolph was offloading his boat and retold the story. In a whisper the officer cut me off and motioned that the guy fishing behind him was the one responsible. Well, at least he had learned to do his shad fishing from the bank; or as Rudolph later pointed out, "I don't think anyone is going to be lending him a boat."

On The Water

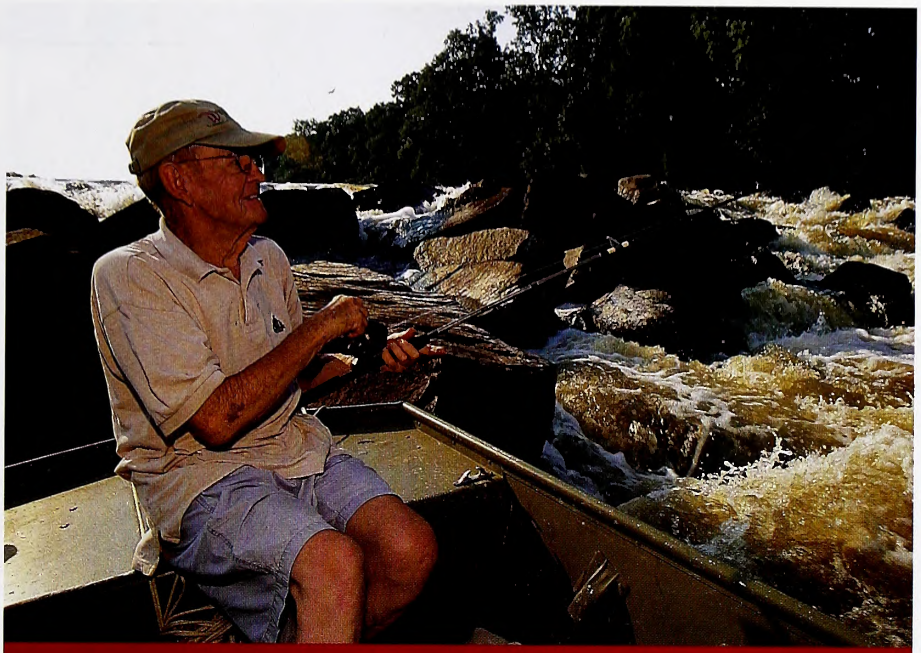
Except as a fresh target for his fishing stories, I was no help at all. Rudolph let me tie the boat to various objects and deploy and retrieve anchors, but he was fishing by himself. He would nose the boat up-current into position, and by the time I had finished looping rope over stationary objects, he would have four lines in the water. The current held the lines taut; the darts rode the currents with teasing motions below the surface. Rudolph fishes three darts to a line, each separated from the next by a number of yards allowing the gear to annoy shad simultaneously at different depths.

Some days Rudolph fished from the same spot, and on others he moved his johnboat two or three times. Often he would take over a spot vacated by a boat that had caught its limit (10 fish per person, per day), but sometimes we would just untie and move to a new spot for no apparent reason. It took me a few days to see any pattern. We were fishing where the current was strongest and the water was deep. "Some holes below the locks are 58 feet deep, but in most places we are in 10 to 12 feet of water," Rudolph shouted above the noise of the river.

We were fishing below the No. 2 lock, one of three locks constructed between 1917 and 1919 to enable barges to work the Cape Fear between Wilmington and Fayetteville during periods of low water. The locks continue to allow boat traffic to move up and down the river by maintaining high water levels. Of course, the locks also prevent migratory fishes such as shad from moving freely through the river. This was a concern when the locks were first built, so fish ladders were provided. Unfortunately, the engineers in charge did not do their homework. Fish ladders, which are readily used by species such as salmon, were totally ignored by the shad. So during the spring shad run the personnel assigned to the locks open them every three to four hours, lifting the shad to the higher stream levels. Nonetheless, the migrating fish are confused by the dam and tend to accumulate below the locks while they try to figure out how to get past them.

On this day, the darts were playing 20 yards or more behind the boat, and it would be informative to see how the shad interacted with them. Rudolph's intuition was in constant play. He thought the 1/4-ounce darts were best, but occasionally he shifted over to 3/8-ounce or 1/16-ounce darts. "The color doesn't make much difference," he would say each time he changed out one color of dart for another.

In the 1950s, Rudolph first started using shad darts (top, left), and he has been hooking them ever since. On some days, Rudolph fishes from the same spot with success. However, on other days he can move two or three times trying to find just the right spot (above, top). Once all the fish have been caught, Rudolph supplies the fish and the cooking skills for the popular shad fry (above).



Shad Facts 101

American shad are related to sardines, anchovies, herring, alewives and other species of shad. There are eight species of shad and herring in North America, including hickory shad.

RANGE: At sea, American shad summer in the Bay of Fundy in Nova Scotia, and then spawn in Atlantic coastal rivers from southern Canada to northeastern Florida. Because of their economic potential, they have been introduced to the Pacific coast of North America, the Mississippi River, streams in Colorado and the Great Lakes.

AGE: American shad typically have a lifespan of five to seven years. The oldest known shad lived 11 years.

SIZE: In North Carolina, most bucks are about 16 to 18 inches long, and roes measure 18 to 24 inches. Shads' maximum size is 30 inches.

WEIGHT: Females weigh 3 to 4 pounds, with some up to 12 pounds; males seldom reach more than 2 ½ pounds.

FOOD: Juveniles eat aquatic worms, crustaceans and insects. Adults eat large zooplankton, fish eggs and small fish.

ILLUSTRATION BY DUANE RAVER

AMERICAN SHAD, *Alosa sapidissima*

A Fish of History

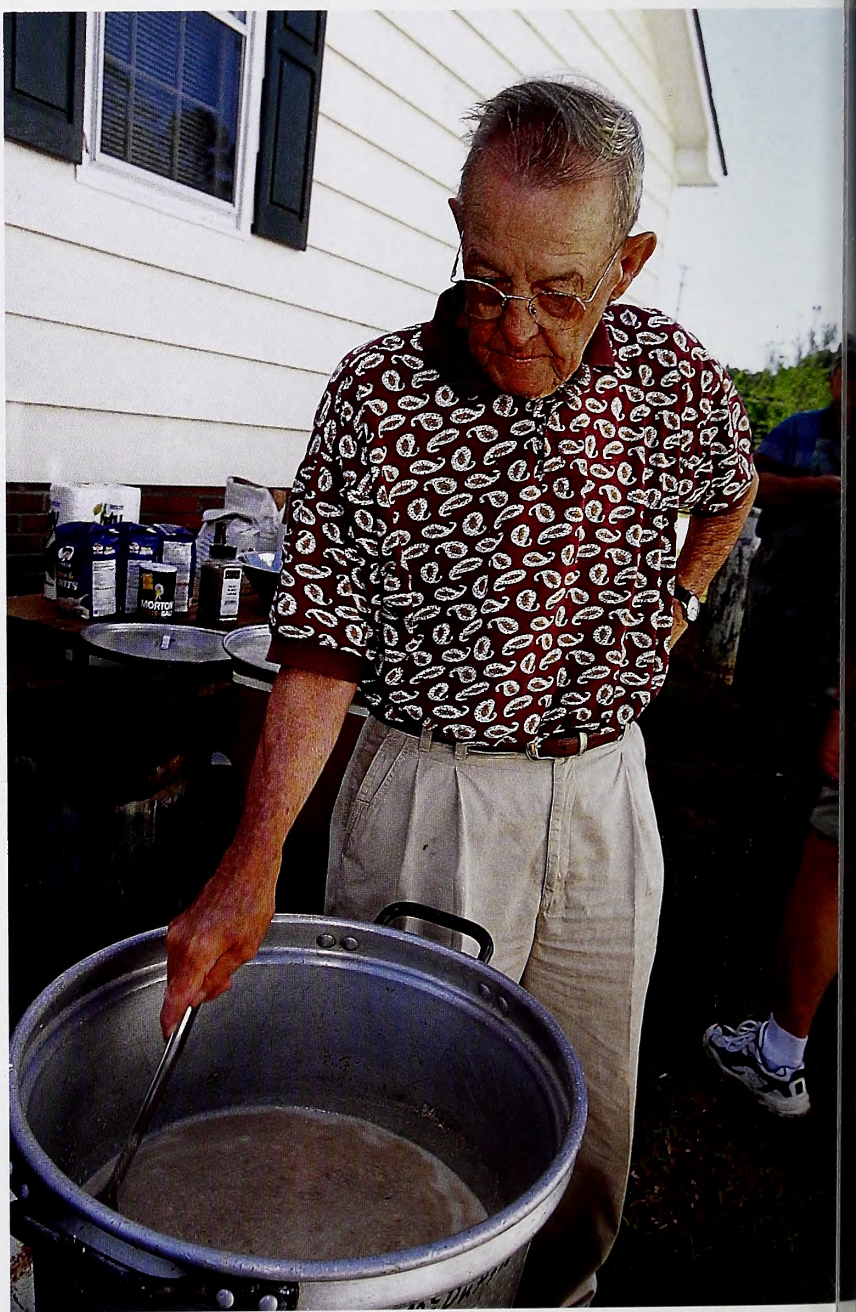
The American shad was an important species for both American Indians and European colonial settlers. Its massive spring spawning runs brought a marine resource inland, where the fish were easily captured en masse. They arrived at a time of year when winter food stores were largely depleted, and nearly everyone became involved with some aspect of the fishery.

The Native Americans mythologized shad. The March spawning runs were a key part of their calendars, and studies of New England Indian middens show that coastal tribes were living off shad, not salmon. The stories we heard in school about Indians teaching Pilgrims at Plymouth to fertilize their crops with dead fish were true — and we learn from writings of the original settlers in 1621 that the fish used were shad. In Philadelphia barrels of shad served as currency. Owners of downstream farms built dams to prevent upstream migrations of shad, providing a larger catch. In return, owners of upstream sites raided their neighbors, starting feuds in some places that created a lawless society like the one we associate today with the Wild West.

These fish played major roles in the lives of George Washington and Thomas Jefferson, who both maintained riverside shad fisheries as a major source of income. Henry David Thoreau is considered to be the first to recognize the effects of dams on the fish migrations. Because of the shad fishery, land along rivers became worth much more than nearby agricultural property. Shad shaped not only our history but our economy as well.

NATURE'S WAYS

How do American shad hear?
See Nature's Ways, page 39.



At the end of the season, a local shad fry is organized. Rudolph supplies and cooks the fish. In addition to the grits, hush puppies and slaw that are there, Rudolph cooks up shad roe and eggs. His particular recipe calls for bacon, salt and pepper, and it is quite popular with the hundred or so people that attend.

For a rod-and-reel fisherman, a hooked 4-pound roe shad puts up a darn good run, but even the smaller "bucks" give quite a fight. The females are much stronger, of course, and on occasion ones are caught here that weigh 5 or 6 pounds. A male averages 2½ pounds. The difference was obvious to Rudolph. He would say, "This is a nice roe," within seconds of hooking into one, long before the fish was in sight. Rudolph would position the line clear of the boat and then gradually work the fish, once it was close to the boat, and while holding the rod high with his left hand, he would net the shad with his right. Shad don't surrender, and a number of them shook the darts within the first minute of being hooked; others got away just as the net was scooping down. The daily limit was 10, so as the day went on, the bucks were often released unceremoniously so that the fishing could continue until late in the day.

The Payoff

Toward the end of the season, he starts stocking up on shad, and in early May my wife's father and uncles host a shad fry. Rudolph supplies and cooks the fish, and the other hundred or so folks bring their appetites. Just to infuriate all the women in Elizabethtown it is a men-only event where bankers, plumbers, lawyers, policemen, auto mechanics and insurance salesmen catch up on their versions of the local news, swap stories and devour shad and hush puppies.

Several years back Rudolph was hit hard by cancer, and his recovery was slow and painful. He remained in bed, feeling unhappy and grumpy—and that was on the good days. One afternoon one of my wife's uncles and her cousin stormed into Rudolph's bedroom and extracted him from bed. They drove him to the Cape Fear boat ramp and helped him into his boat. With rods in hand and a box full of shad darts, they headed toward the locks. For Rudolph the shad were therapeutic, and his recovery was almost immediate.

American shad are anadromous, which means they spawn in fresh water and grow up at sea. Anadromous fish also include sturgeon, striped bass, salmon and some other species of shad. (Our eels are just the opposite; they grow up in fresh water and breed far at sea. They are catadromous.) Shad migrate farther upstream than any other anadromous fish; prior to the construction

of dams, some were reported to ascend more than 300 miles up Atlantic coastal rivers. Once the rivers warm up, shad migrations are rapid. A ripe roe shad deposits between 125,000 and 600,000 eggs that drift with the current until they hatch in about eight to 12 days. Soon after spawning, many of the adults die; however, recent research has documented Cape Fear shad that returned to spawn two, three and even four more times.

Young-of-the-year shad remain near the mouths of their home rivers or in nearby estuaries until fall and then migrate out to sea. In three to five years when most reach adulthood, they return to the same rivers where they were spawned. The rivers with the fewest dams and other obstacles and the least pollution support the best shad runs. Shad migrations bring a huge amount of biological mass far inland, and this provides a key energy source for the rivers. It's not just the returning adults; the millions and millions of fry are important direct or indirect food sources for everything from dragonfly larvae to kingfishers. Yes, shad support an important commercial and recreational fishery, but they also help feed the rivers.

At one time the shad industry in North Carolina and elsewhere along the Atlantic coast was one of the major fisheries in the New World. Shad populations started to decline by 1850. The Bureau of Fisheries kept records of the landings of American shad starting in 1880. In North Carolina alone, the harvest peaked at nearly 9 million pounds in 1897. By 1947 this figure had dropped to only 900,000 pounds, about 12 percent of the peak harvest. Overharvest by commercial fishermen both at the mouths of rivers and at sea in the intervening years took its toll. However, pollution of estuaries and rivers and, more important, dams that prevented successful upstream spawning runs caused the populations to crash. Today, the Delaware River is the only major river on the Atlantic seaboard that remains free-flowing, and it has become the mecca for shad sport fishing.

Over the years, also, our preferences changed; shad roe and scrambled eggs have been replaced by super-sized Egg McMuffins, and today many people find shad too strong for their taste. So for a number of reasons shad will probably never occupy its former importance as a major commercial species.

For Rudolph, too, his commercial shad fishing ended years ago. One spring about 20 years back, while checking his nets at the mouth of the Cape Fear, he discovered that apparently a submarine had strayed out of the main shipping channel and damaged his nets beyond repair. Sport fishing with a rod and reel was more fun anyway, so he let his commercial license expire and now waits for any sign of spring and a reason to be back on the river. For the rest of us, forget the dogwoods and the return of swallows: The first signal that it's spring is seeing Rudolph's boat hooked to the back of his pickup. ◆

Frequent contributor David S. Lee is director of the Tortoise Reserve, an international turtle conservation organization.

The FISHING Party

illustration by
Jackie Pittman

written by
Neal Conoley,
John Conoley
and Jim Conoley

A sturdy Outer Banks captain and his mate find common ground with a bold bunch of mountain anglers.

1968

IN 1968, the Oregon Inlet charter fleet was going strong, attracting fishermen from around the country for a chance to catch dolphin, tuna, wahoo and maybe even a billfish. One group of North Carolina anglers might not have come as far as others, but their trip was nonetheless memorable.

This group drove from deep in the mountains all the way to the Outer Banks to catch some fish. The mountain men had been to Oregon Inlet the previous year, and they had their adventure all planned out. They would leave home early in the morning, drive 500 miles across North Carolina and arrive at the Oregon Inlet Fishing Center just after dark. They would fish all the next day and then start back home the same night. Frugal by nature, they would bring enough food and drinks for the entire trip and sleep in the car.

After a long day's drive, the group arrived at Oregon Inlet on schedule. They parked their old station wagon directly behind the *Erma Queen*, the same boat they had fished on the previous year. Six big men crawled out of the car and immediately broke out sandwiches and soft drinks in the parking lot. After a stroll around the dock, the men drew straws to see where they would sleep. Before long, the mountaineers had rolled out their blankets and prepared for the evening that lay ahead. Two were in the front seat, two were in the back seat and the two lucky winners had the bed of the station wagon.

During the night, a low-pressure system formed off the coast, and a strong northeast wind kicked up. By the time the first captain arrived at the Fishing Center, the station wagon was rocking from wind gusts that measured over 25 knots. Undaunted, the relentless fishermen piled out of their quarters and prepared for their fishing trip. When the last man finally stood upright, a blast of wind whisked the cap off his head, hurling it into the dark waters of the turning basin. The bald-headed mountain man ran over, as if he had lost a child, to a mate standing nearby and the two fished his cap out with a long-handled gaff. A small disaster had been averted, but a bigger one awaited.

H.T. Gaskins, veteran captain of the *Erma Queen*, arrived to dispatch the bad news to his fishing party. The wind was predicted to increase throughout the day, and the charter fleet was not going out. Either wait until tomorrow or try again next year, he told them. For this group, however, neither option was acceptable. These were hearty souls who were here to go fishing and, by gosh, they were going fishing no matter the weather.

A WILLING CAPTAIN

The men tried to talk Captain Gaskins into making the trip, but he would have none of it. Feeling sorry for their plight, H.T. offered a suggestion. They could drive to Oden's Dock at Hatteras and ask Bobby Scarborough if he would take them fishing on the *Red Fin*. Gaskins knew that Bobby was famous for going when no one else would. He also wanted to pay back Scarborough for several practical jokes that he had pulled. This could be the perfect solution.

Without hesitation, the fishing party concurred with the plan and piled into the station wagon for their trip to Hatteras. They arrived at Oden's Dock in about an hour and located the *Red Fin* in a line of charter boats still tied to the dock. Captain Scarborough, grandson of Wanchese boatbuilder Bob Scarborough, had already sent his mate home for the day and was preparing to leave himself when the six big men, each dressed in a red flannel shirt, bib overalls and brogans, showed up behind his boat. Surely they didn't want to go fishing.

Captain Scarborough . . . had already sent his mate home for the day and was preparing to leave himself when the six big men, each dressed in a red flannel shirt, bib overalls and brogans, showed up behind his boat. Surely they didn't want to go fishing.

The Red Fin headed around the breakwater and up the channel to Hatteras Inlet. White water broke all the way across the inlet, and the waves were at least 10 feet tall. Rain squalls added to the misery as Scarborough carefully navigated the inlet.

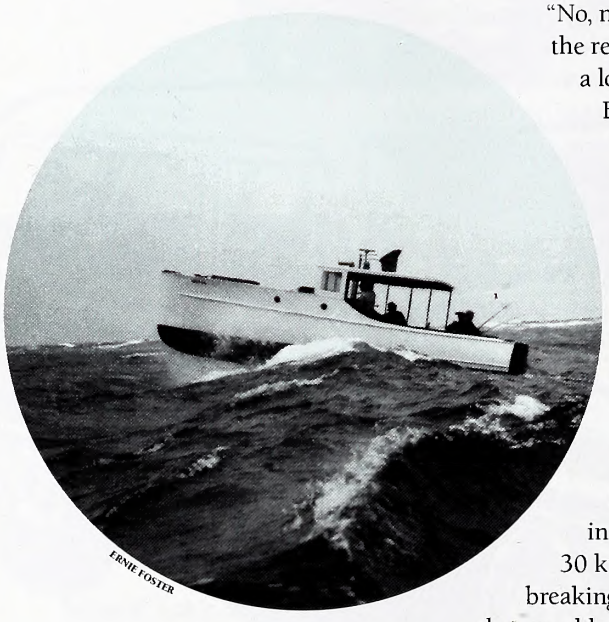
MEN, BOATS & FISH: A TOUR IN HISTORICAL PHOTOS OF SPORTFISHING ON THE COAST. The photos continue on pages 30–31.

❶ James Rose stands in front of the famous Rose Brothers Boatworks shop on Harkers Island, 1967. ❷ The *Sportsman*, with Captain Omie Tillett at the helm, backs into her slip at the Oregon Inlet Fishing Center. This boat was built by Captain Warren O'Neal and is the prototype for contemporary Carolina-style sportfishing boats, 1961. ❸ Legendary charter fisherman Captain Bobby Scarborough checks his tackle. Sunny Briggs, a famous charter captain and boatbuilder who docked at Oden's beside Scarborough, said fishing against him was like pitching to Babe Ruth every day, Hatteras, 1968. ❹ Lucky fisherman poses with a 585-pound marlin caught on the *Red Fin* with Scarborough (right) and mate Allen Burrus (kneeling) Hatteras, June 28, 1968.

In a dialect he had never heard, one man asked Bobby if he would take them fishing. Captain Scarborough replied in his best "hoi toide" accent, "I think so. I just had a quitter for tomorrow and you can fill in."

"No, not tomorrow. *Today*!" came the response in unison. There was a long, long pause, and before Bobby could speak, one of the men said, "We figured you'd be too scared to take us."

That did it. Without hesitation Bobby responded, "OK, but we're coming in when you get sick." Everyone agreed and Scarborough called his mate, Allen Burrus, to return to the dock. This would be an easy $150 because the winds were increasing, now clocked at over 30 knots, and waves would be breaking over the bar. Bobby figured they wouldn't even get offshore before this mountain party would give up.



Captain Hallas Foster on the charter boat *KoKo* navigates Hatteras Inlet, 1948.

As the group made preparations for the big day, Bobby and Allen exchanged snide glances. The men loaded a bag of sandwiches, some apples and an old rusty washtub filled with soft drinks and ice. These guys didn't even have a cooler. This was too easy.

The *Red Fin* headed around the breakwater and up the channel to Hatteras Inlet. White water broke all the way across the inlet, and the waves were at least 10 feet tall. Rain squalls added to the misery as Scarborough carefully navigated the inlet.

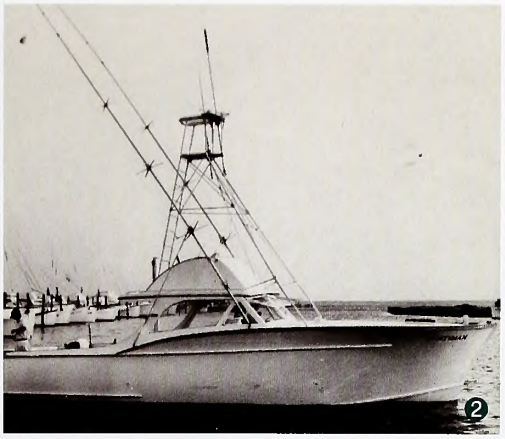
Once in the ocean, they headed toward the light tower at the tip of Diamond Shoals. Bobby was expecting someone to call it quits at any moment. When the *Red Fin* took a couple of waves over her bow, Bobby glanced back to make sure that the cabin was draining. To his astonishment, all six big men in their wet, red flannel shirts, bib overalls and brogans were laughing and drinking sodas. Good grief, how could that be?

MASSIVE SEAS, INCREDIBLE FISHING

For two-and-a-half hours the *Red Fin* labored into a massive head sea. As they neared the shoals, the waves grew to over 15 feet, and the rain beat down even harder. Captain Scarborough had sized up the mountain men, and if they could make it, so could he. Bobby motioned for Burrus, who was hanging on for dear life, to put some lines out. Allen managed to get two spoons overboard, and as soon as the lines straightened, two fish were hooked. Giant bluefish, each weighing over 15 pounds, were landed and thrown into the fish box. The spoons went back overboard and quickly returned with the same results. Two more huge bluefish and two more happy anglers. One of the smallest men in the group latched on to something big, a 55-pound amberjack. In his best mountain drawl he hollered out to his friends that this fish was really "a-feudin'" with him, and it was going to take some "doin's" to get him in.

Soon the box was full, but the fishing hadn't slacked off one bit. Burrus was bringing fish in so quickly that all he could do was pull the hook and let them flop on the deck. Over the next three hours, the party caught one after another, and by 2 p.m. they were knee-deep in fish. Everyone, including Allen, had fallen into the slimy mess. Bobby couldn't control his laughter. What a sight! Big fish, big waves and big mountain men — how could anything be more fun than this?

At 2:30, Captain Scarborough turned the *Red Fin* for home. He still had to get everyone safely



back to shore, and the weather had not let up. After a couple of hours through the slop, Bobby eased into Hatteras and backed into his berth. Allen threw the fish onto the dock and counted them: 67 big bluefish, 10 albacore and 6 amberjack.

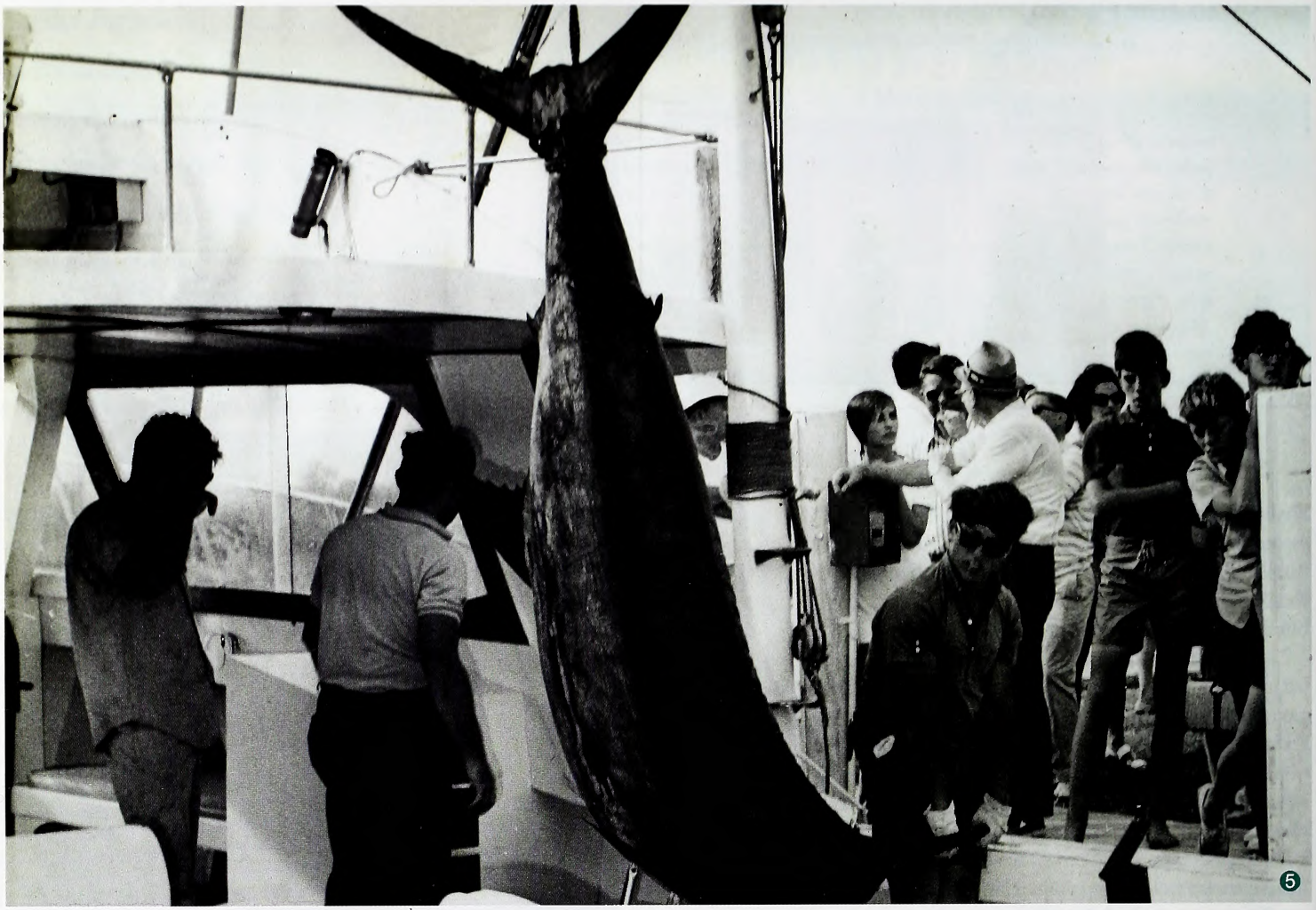
The mountain men threw their empty washtub up on the dock alongside the fish and backed their car as close as possible. One man opened the hatch, and the rest began launching fish right into the back of the station wagon. They packed fish into every square inch, leaving only enough room for three men in the front seat and three in the back seat. When they realized that all of the fish wouldn't fit inside, they stacked the remainder on top of the car. Then, they lashed the whole mess down.

The mountain men profusely thanked Captain Scarborough and Allen Burrus for a great trip. They paid the captain and headed for the car when they noticed their old washtub. After a brief huddle, one man eased over to Bobby and whispered sincerely that since they didn't have room to take the tub home, they wanted Allen to keep it as a reward for his hard work.

The men thanked Bobby again and crammed into the car. Their wet, slimy clothes hardly dampened their enthusiasm. They were clearly excited about heading back to the mountains and figured if they could get there before daybreak, they'd have enough time to show off their catch before the community fish cleaning. They had enough fish to last another year, and they were already planning their return. Bobby and Allen silently prayed for good weather.

Bluefish tails were fluttering in the wind as the station wagon headed up N.C. 12. In a moment of reflection, Captain Scarborough realized that these mountain men were just like him: determined, enthusiastic and adventurous. The only difference was, "My Lordy, they sure did talk funny." ◆

PHOTOS COURTESY OF: 1) CORE SOUND WATERFOWL MUSEUM 2) OUTER BANKS HISTORY CENTER 3) BOBBY SCARBOROUGH 4) ALLEN BURRUS



Carolina Flare

"The Fishing Party" is excerpted from "Carolina Flare: Outer Banks Boatbuilding and Sportfishing Heritage," authored by Neal Conoley and sons.

Neal is president of the N.C. Aquarium Society and the author of the 1982 book, "Waterfowl Heritage: North Carolina Decoys and Gunning Lore." John teaches in the biology department at East Carolina. Jim is the Webmaster for N.C. Aquariums.

"Carolina Flare" (304 pages, 617 photographs, $60) is due to arrive in book stores about mid-May. The book may also be ordered from www.carolinaflare.com.

❺ Scarborough (far left) watches as Burrus unloads a marlin caught on the *Red Fin*, Oden's Dock, Hatteras, 1962. ❻ Scarborough (rear) and Burrus prepare to hoist a marlin to the scales, Hatteras, 1967. ❼ The *Erma Queen*, pictured here with Captain Billy Brown, backs into her berth at the Oregon Inlet Fishing Center, 1973. ❽ Captain Will Etheridge Jr. (kneeling left) and mate Bobby Scarborough (kneeling right) display a catch onboard the *Chee Chee*. Captain Etheridge and Scarborough were among the best fishermen on the Outer Banks, Oregon Inlet, 1956. ❾ Two sailfish caught by Kinston physicians Dr. T. Leslie Lee (left) and Dr. Branch Moore on the *Moonglow*. This is the first documented catch of two sailfish on one boat in one day in North Carolina waters, Morehead City, 1949. ❿ Bettie Kellogg christens the *Sea Byrd* as Captain Warren O'Neal looks on, Manteo, March 1963.

PHOTOS COURTESY OF 5) ALLEN BURRUS 6) ALLEN BURRUS 7) OUTER BANKS HISTORY CENTER 8) OUTER BANKS HISTORY CENTER 9) CARTERET HISTORY MUSEUM 10) OUTER BANKS HISTORY CENTER

Today they live among us as humble plants of woods and wetlands. But in the (very) old days, clubmosses and horsetails ruled the forest. In fact, they *were* the forest.

Nature's Time Travelers

written by Terry Krautwurst / illustrated by Consie Powell / nature activity by Anne M. Runyon

More than a quarter of a billion years ago—before dinosaurs, before birds, before flowering plants—much of Earth was a hot, humid jungle of primitive bushes and trees. Some were ferns up to 26 feet tall. Many, however, belonged to two other groups of early land plants: the clubmosses, or lycopods, and horsetails.

FOREST OF GIANTS

Some lycopods towered more than 120 feet—four times taller than the biggest ancient ferns—and had trunks six feet across. Huge horsetails, their green trunks bristling with brushy branches, grew to almost 100 feet high and three feet across.

Unlike the ground-hugging true mosses that had come before them, clubmosses and horsetails were *vascular* plants: They had systems of strong tubular cells for standing upright and for carrying water and nutrients from the soil to feed the plants' growth. And grow they did!

High in their top limbs, the trees dangled cones that released clouds of spores into the air. Spores are a bit like the seeds that most plants today make. But spores have to be wet in order to develop. Our young planet's soggy swamps and rainy lowlands were perfect places for spore plants. Together with other, smaller kinds of clubmosses and horsetails, the giant trees covered the land.

fossil equisetum

FIELD HORSETAIL
(*Equisetum arvense*)
In spring, field horsetail, our most common species, sends up a brownish stalk with a spore-filled strobilus. Later it grows a separate green stalk with stringy branches.

SHINING CLUBMOSS
(*Huperzia lucidula*)
Unlike its relatives, shining clubmoss propagates by releasing little bulblets called gemmae. The bulbs grow into plants, creating fingery tufts of green in mountain forests.

TREE GROUNDPINE
(*Lycopodium dendroideum*)
Found only in high-elevation spruce-fir and northern hardwood forests, this delicate "Christmas tree" is one of four clubmosses on the state's Rare Plants list.

SCOURING RUSH
(*Equisetum hyemale*)
This horsetail resembles skinny bamboo. In North Carolina it's uncommon in the wild, but is a popular nursery plant for ponds and bog gardens.

CLIMATE CHANGE

For over 100 million years, clubmosses and horsetails ruled. As generations lived and died, the plants' remains formed thick layers of slowly rotting vegetation called peat.

But gradually Earth's climate became less rainy. Without constant moisture to help them grow and reproduce, the great plants couldn't survive. The swamps disappeared, and the giant trees with them. Over millions of years, the layers of peat were buried in mud and sand. Pressure and heat turned the peat into coal. The coal we burn today is made mostly of ancient clubmosses, horsetails and ferns.

ANCIENT CYCLES

Because they're related to ferns, clubmosses and horsetails are called "fern allies." Today, they reproduce much like their ancestors: when a spore falls to the ground and finds the right conditions, it develops into a tiny structure called a prothallus. The prothallus produces eggs and sperm. Before a new plant can grow, a sperm must swim to the female part of a prothallus to reach an egg. For this to happen, the prothallus must be wet. That's why, like ferns, clubmosses and horsetails need moisture.

Horsetail stems contain tiny grains of sandlike silica. Pioneers used them for scrubbing pots and polishing wood.

FOXTAIL CLUBMOSS
(*Lycopodiella alopecuroides*)
Some of the bristly stems of this moisture-loving clubmoss arch along the ground, while others stand straight up. The foxtail is one of five bog clubmosses in North Carolina.

SURVIVORS

Some of the smaller prehistoric clubmosses and horsetails adapted to Earth's drier conditions. Their descendants live among us today. But you have to look down, not up, to see them.

Clubmosses grow on stems, or rhizomes, that creep along or under the ground. The rhizome sends up shoots that resemble four- to six-inch-tall evergreen trees or boughs. The little "trees" pop up from the spreading tips of their stems, creating a miniature forest no higher than your boot tops.

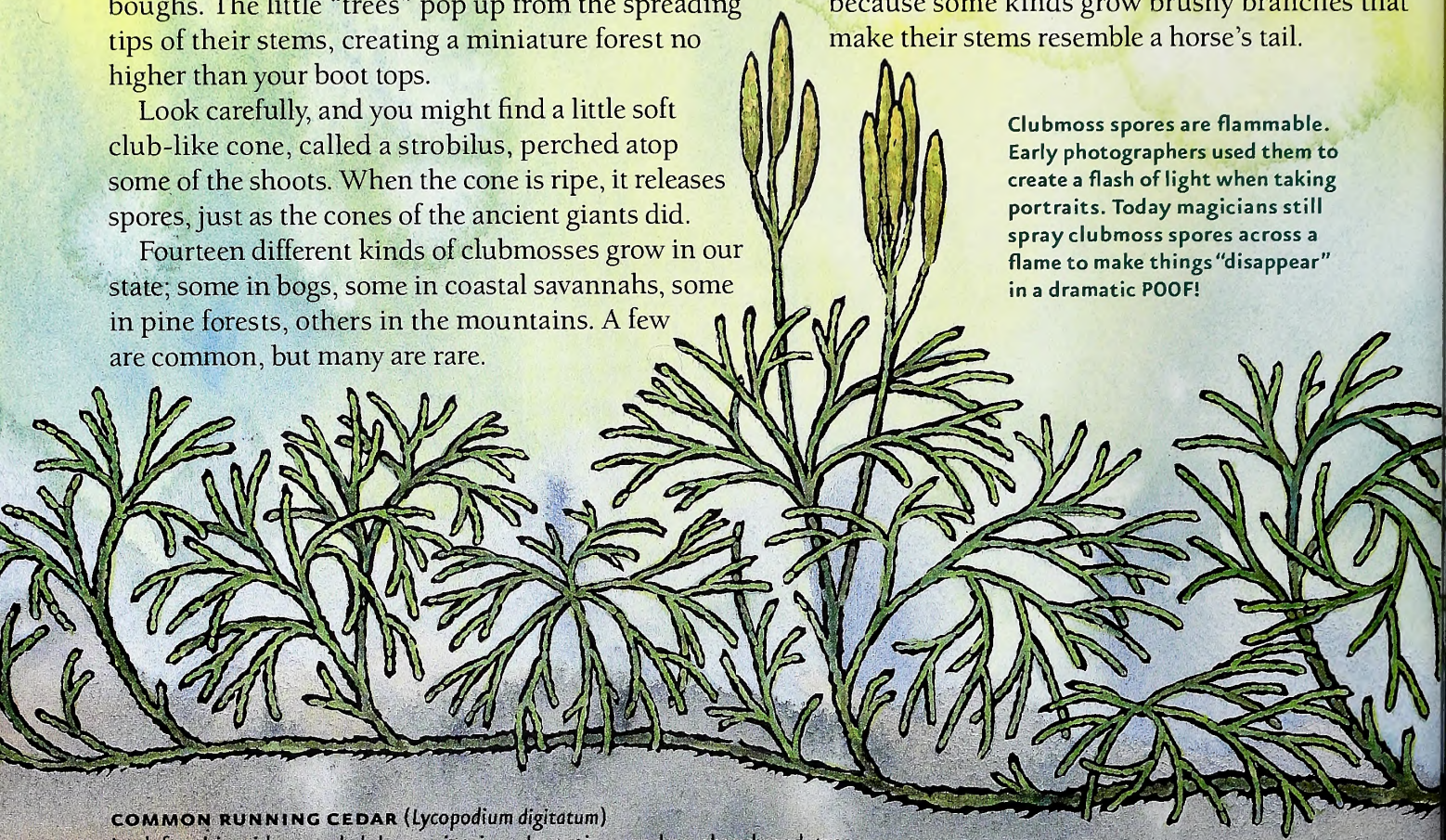
Look carefully, and you might find a little soft club-like cone, called a strobilus, perched atop some of the shoots. When the cone is ripe, it releases spores, just as the cones of the ancient giants did.

Fourteen different kinds of clubmosses grow in our state; some in bogs, some in coastal savannahs, some in pine forests, others in the mountains. A few are common, but many are rare.

Horsetail plants grow along streambanks and in wet woods. They have stiff, hollow green stems. Most are are only 2 or 3 feet tall and less than ½ inch wide.

Horsetails grow from underground stems and, like clubmosses, produce spores. Their strobilus is rounded with a pointy tip. Horsetails got their name because some kinds grow brushy branches that make their stems resemble a horse's tail.

Clubmoss spores are flammable. Early photographers used them to create a flash of light when taking portraits. Today magicians still spray clubmoss spores across a flame to make things "disappear" in a dramatic POOF!



COMMON RUNNING CEDAR (*Lycopodium digitatum*)
Look for this widespread clubmoss in pine plantations and on abandoned, tree-covered farm fields in the mountains and piedmont. Because of its shape, it's also known as crowfoot clubmoss.

Get Outside

Search for clubmosses and horsetails. Use a field guide, and check out the "Ferns and Fern Allies" maps on the UNC Herbarium's website (www.herbarium.unc.edu/distribution.htm) to see which kinds live in your county. Ask local naturalists and gardeners to show you the plants.

Use a hand lens to get a *really* close look. With their spores and tiny leaves, primitive plants make interesting subjects when magnified. Now imagine the same plants *hundreds* of times bigger, like their prehistoric ancestors.

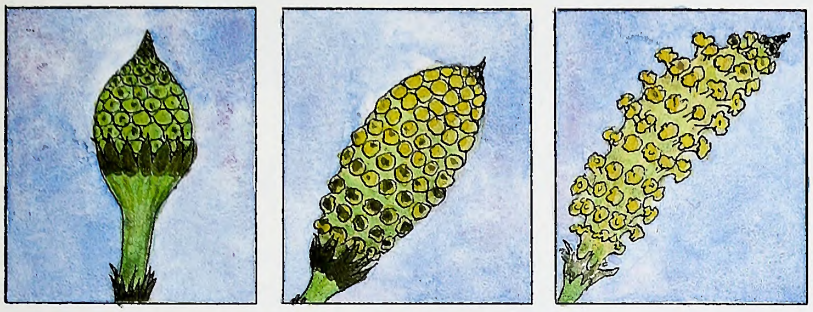
Look for other "time travelers." At the same time giant clubmosses and horsetails ruled the forest, 6-foot-long centipedes lumbered over the ground; dragonflies with 2-foot wingspans zoomed through the air; ferns two stories tall swayed in the wind; thick mosses cloaked the ground. They're all still with us—in miniature.

Read and Find Out

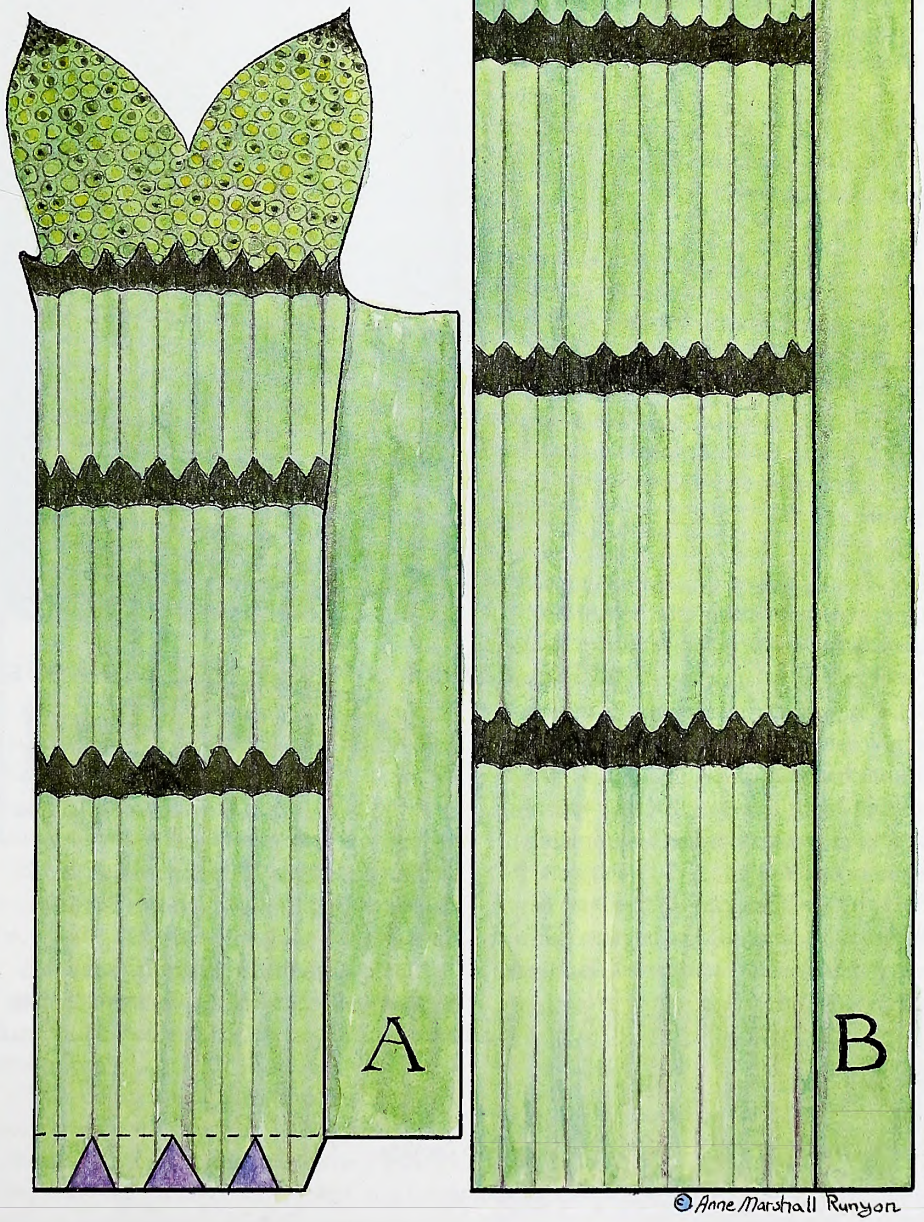
- "When Bugs Were Big, Plants Were Strange, and Tetrapods Stalked the Earth" by Hannah Bonner, National Geographic Society, 2003.
- "The Visual Dictionary of Prehistoric Life," Dorling Kindserley Limited, 1995.
- "Flora of the Carolinas, Virginia, and Georgia, and Surrounding Areas" by Alan S. Weakley, North Carolina Botanical Garden, University of North Carolina, 2006, www.herbarium.unc.edu/flora.htm.
- "Plantwatching" by Malcolm Wilkins, Facts On File, 1988.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Equisetum hyemale— Make a Scouring Rush Sculpture



A strobilus grows, sprouting many sporophylls which shed tiny spores.



1) Cut out sections **A** and **B** of your *Equisetum*.

2) Fold bottom of **A** up along the --- line.

3) Unfold and cut away the purple triangles. Fold bottom up again.

4) Curl **A** into a cylinder carefully matching the black lines together. Tape shut at top and bottom.

5) Fold top of **B** in a zig-zag, down along ··· line, and up along --- line.

6) Curl **B** into a cylinder carefully, matching the black lines together. Tape shut at top and bottom.

7) Use finger to smooth the inside of B, and then slide the bottom of **A** into the top of **B**.

8) Glue tip of strobilus shut. Your *Equisetum* will grow (and shrink).

©Anne Marshall Runyon

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Gray Trout Limit Reduced By One

North Carolina fishermen will see little change in weakfish regulations this year following action in February by the Atlantic States Marine Fisheries Commission (ASMFC). That commission lowered the recreational harvest from seven fish to six fish per day for anglers from Massachusetts to North Carolina, and set the commercial harvest at 3.7 million pounds. Individual states have until Oct. 29 to implement the new management measures.

The problem with weakfish (gray trout) has been a curious one, and one in which fishing has played little part. While biologists were still coming up with high population assessments for weakfish in the late 1990s through 2003, commercial and recreational fishermen were recording all-time lows in landings. When the ASMFC re-examined data on the species from 1982–2003, it found that a significant rise in natural weakfish mortality had begun in the mid-1990s.

The reasons behind the natural mortality remain uncertain, although the ASMFC believes that a decline in forage fish for weakfish, particularly Atlantic menhaden, and an increase in predation by striped bass probably have been the heart of the stock's decline. That said, the ASMFC also has stated that "contributions by other species or factors may not have been completely detected or tested."

For the time being, the one fish per day reduction in the recreational bag limit is the primary change. Total commercial landings along the Atlantic Coast were only 1.1 million pounds in 2005, far below the 3.7 million pound limit, which was based on the average landings from 2000–2004.

Most weakfish are caught by both commercial and recreational fishermen in state waters of the Atlantic. Most commercial landings occur in the fall and winter, while recreational landings peak from May to October. In 2005, while the Atlantic Coast commercial catch again fell, the recreational catch rose 84 percent over the previous year, although the sportfishing catch in North Carolina actually fell by more 100,000 that same year.

North Carolina has historically been a major player in weakfish landings, having accounted for more than half of all weakfish commercially landed since 1982. North Carolina commercial harvesters again led the Atlantic Coast in 2005, with Virginia second and New Jersey third. Recreationally, North Carolina (157,000 pounds) ranked a distant second to New Jersey (1,145,000 pounds).

Another change for North Carolina this year is an increase in the recreational flounder size limit from 14 inches to 14 ½ inches for ocean fish. This size increase, which took effect Feb. 8, was necessary for North Carolina to stay in compliance with the Mid-Atlantic Fisheries Management Council and the ASMFC fishery management plan for summer flounder. Both the coastwide recreational and commercial quotas for summer flounder have been lowered in 2007 in order to help end overfishing of this important stock.

The eight-fish daily harvest limit for the ocean is unchanged. The harvest limit for flounder taken in internal waters, such as sounds and rivers, remains the same—14 inches and eight fish per day.

ATLANTIC COAST COMMERCIAL WEAKFISH HARVEST (IN POUNDS)

2000	5,400,529
2001	4,999,539
2002	4,772,978
2003	2,001,271
2004	1,573,442
2005	1,117,517

ATLANTIC COAST RECREATIONAL WEAKFISH HARVEST (IN POUNDS)

2000	4,154,793
2001	2,722,629
2002	2,192,603
2003	864,960
2004	860,086
2005	1,584,547

NORTH CAROLINA'S WEAKFISH HARVEST

	COMMERCIAL	RECREATIONAL
2000	1,869,073	87,926
2001	1,960,380	82,747
2002	1,828,052	82,747
2003	848,847	161,474
2004	685,429	267,625
2005	421,469	157,018

ILLUSTRATION BY DUANE RAVER

IN SEASON

This month, these hunting seasons are open in North Carolina:

Hatchery-Supported Trout Waters: Through June 30.

Wild Turkeys (bearded only): Through May 12.

Check the *2006–2007 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

Pechmann, Taylor Gain Wildlife Federation Honors

John E. Pechmann and Senior Wildlife Officer Ryan Taylor have been honored by the N.C. Wildlife Federation. Pechmann, the four-term chairman of the N.C. Wildlife Resources Commission who died unexpectedly in July 2006, was posthumously inducted into the state's Conservation Hall of Fame. Taylor, a native of Lumberton who is now based in Carteret County, received the Governor's Award as the Wildlife Enforcement Officer of the Year for 2006.

NCWRC

Ryan Taylor works out of Carteret County.

The Conservation Hall of Fame is administered by the N.C. Wildlife Federation's board of directors, with membership reserved for only those individuals whose contributions to natural resources in North Carolina are long-term, pioneering and result in significant positive benefits for wildlife.

"During his tenure on the Wildlife Commission, Pechmann worked to enhance and strengthen the agency and its role as benefactor of natural resources," said T. Edward Nickens, chairman of the Wildlife Federation's Awards Committee.

"When John Pechmann assumed the gavel of the N.C. Wildlife Resources Commission in 1999, the commission managed almost a million acres of public game lands and operated a single wildlife education center," Nickens said. "During his years as chairman, managed game lands increased to well over 2 million acres and the commission could boast of three fully staffed and operational wildlife education centers."

A fishing and aquatic education center in Pechmann's hometown of Fayetteville is expected to open later this year and will be named after him.

Although the list of his accomplishments is long, Nickens said it was worthwhile to point out that Pechmann had an instrumental role in the approval, funding and construction of the commission's administrative headquarters on the Centennial Campus of N.C. State University, a "green building" which has been recognized with various environmental design awards. He was the Conservationist of the Year in 2000 and was successful in efforts to increase the state's wildlife endowment fund. He also helped form a Disabled Sportsman Program that pushed for 51 handicapped-accessible boating areas across the state and gained national recognition for its hunting and fishing events.

Taylor, a 6-year veteran with the commission, was honored for his unwavering commitment to conservation and an uncommon determination to safeguard the state's natural resources. Nickens said Taylor is well known not only for his tireless efforts in enforcing boating, fish and game laws, but also his professional and courteous manner. "His courteous demeanor, his supervisor tells me, allows him to be the type of officer who receives a 'thank-you' from the person to whom he has just finished writing a citation," Nickens said.

Taylor was also cited for outstanding work in conservation and outdoor safety education, dealing with both the public and media. He conducts regular programs in boater safety certification, hunter safety programs and the annual Youth Hunter Safety Tournaments.

Taylor is the son of Howard and Vickie Taylor of Lumberton, and is a graduate of Lumberton High School. He holds a B.S. degree in business management from UNC Pembroke. He and wife, Jada, are the parents of a four-month-old son, Easton.

Chatuge Lake Gets New Fishing Access Areas

In just a few months, anglers visiting Chatuge Lake will have three more choice spots from which to cast. A joint effort led by N.C. Wildlife Resources Commission's Division of Inland Fisheries is nearing completion of a new public access area on the Shooting Creek arm of Chatuge.

Located in the northeastern corner of the lake, the area consists of a 'T'-shaped pier extending 56 feet into the lake and measuring 32 feet across at its widest point. This floating structure will provide year-round fishing access, even with a winter drawdown that can drop the lake's water level by nine feet.

In addition to the pier, two 12-by-24-foot raised fishing platforms have been created. Upon completion of a paved access trail this spring, the site will provide the angling public another universal-access site, according to Paul Pittman, the development crew coordinator for the area. "We're trying to provide universal access to all the waters we can," he said, noting the structures are also handicap accessible. "We've done that on several lakes here in the mountains and on streams, too."

Similar projects have been completed on Laughter Pond, Lake Julian, Lake Imaging, Richland Creek and the French Broad River, among others.

The project was funded through contributions from the Tennessee Valley Authority, which completed damming of the 13-mile-long reservoir in 1942. Construction of the structure was provided by the commission's Engineering Services and Inland Fisheries divisions and the U.S. Forest Service.

Anglers routinely catch spotted, largemouth and smallmouth bass from the site, in addition to catfish and sunfish.

Other access areas, including those on the Tuckasegee and Pigeon rivers, are currently in the preliminary stages. For a complete list of existing access points, visit the commission's Web site at www.ncwildlife.org.

NCWRC

CALENDAR OF EVENTS

THURSDAY–SUNDAY, MAY 3–6

Hike the North Carolina mountains at the Great Southeastern Hiking Festival in Montreat and Black Mountain. On the agenda are more than 20 hikes, plus educational seminars and entertainment. Visit http://greatsehikingfestival.org.

SATURDAY–SUNDAY, MAY 5–6

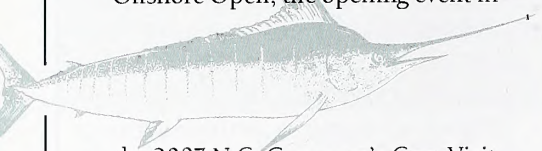
Buy, sell or trade at the Dixie Gun & Knife Classic in the Jim Graham Building on the N.C. State Fairgrounds in Raleigh. Visit www.dixiegunandknifeshow.com.

SATURDAY, MAY 12

Check out Loon Day at the Core Sound Decoy Carvers Guild building near Harkers Island Bridge. Activities include a decoy competition and decoy auction. Lunch is available for a donation. Contact (252) 838-8818 or visit www.decoyguild.com.

WEDNESDAY–SATURDAY, MAY 16–19

Fish for billfish, tuna, dolphin and wahoo in the 13th annual Hatteras Village Offshore Open, the opening event in



the 2007 N.C. Governor's Cup. Visit www.hatterasoffshoreopen.com.

FRIDAY–SUNDAY, MAY 25–27

Explore the paleontology of the Coastal Plain at the 14th annual Aurora Fossil Festival. Contact (252) 322-4238 or visit www.aurorafossilmuseum.com.

SATURDAY–SUNDAY, MAY 26–27

Experience the fourth annual White Squirrel Festival in Brevard. Visit www.brevardnc.org or call (828) 884-3278.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

Johns-Catawba Confluence Lands Protected

Approximately 2,800 acres at the confluence of the Johns and Catawba rivers in Burke County have been added to the N.C. Wildlife Resources Commission's game lands program, protecting a unique wetlands and riverine system.

NCWRC

The acquisition also marks the first conservation transaction supported by Duke Energy's recent Catawba-Wateree comprehensive hydro-relicensing agreement. Foothills Conservancy of North Carolina, which is based in Morganton, negotiated the purchase of the land for $11.5 million from Crescent Resources on behalf of the commission

Funding for the acquisition came from a number of sources. The N.C. Clean Water Management Trust Fund granted Foothills Conservancy $5,235,000 to acquire the land's wetlands and riparian areas. The hydro-relicensing agreement provided for a reduction in purchase price of approximately $2.5 million. The remaining $3.8 million required for the purchase was contributed by Duke Energy as part of the relicensing agreement for land acquisition support.

The land acquired from Crescent Resources includes 17 miles along both sides of the Johns River and Lower Creek downstream of N.C. 18, as well as Catawba River-Lake Rhodhiss frontage. Adjoined by 1,000 acres upstream on the Johns River, acquired in November 2006 by the Wildlife Commission with support from Ducks Unlimited and the N.C. Natural Heritage Program, the Johns River Game Land represents one of western North Carolina's most significant land and water conservation areas.

"The Wildlife Commission now owns one of the largest and most extensive habitats for waterfowl and other species that depend on flooded ecosystems in western North Carolina," said Gordon Warburton, supervising wildlife biologist with the commission. "This area is truly a 'crown jewel' for wildlife and will be a great place for sportsmen and the public to see a unique assemblage of wildlife species."

The Johns River acquisition will not become an official game land that is open to sportsmen until July 1, 2008, because the deadline has already passed to enact regulations for next hunting season.

The confluence of the Johns River with the Catawba hosts rich bottomland habitats and extensive forested floodplains which are rare in the foothills and mountains. Wetlands lace the land, enhancing the water quality of Lower Creek and the Johns River and attracting migratory waterfowl and a wide variety of animals and aquatic life. Designated as High Quality Waters and as a Significant Aquatic Habitat, the Johns River lands are also home to the bog turtle, a species federally listed as threatened. An important section of the Overmountain Victory National Historic Trail crosses the land, adding historical significance to the purchase.

ON PATROL

Master Officer Milton Jones, Wildlife Officer David Ritzheimer and Lt. Rick Venable were working a report of late duck shooting near Grimesland when they observed two hunters on four-wheelers. The hunters continued shooting for 45 minutes past legal shooting time, which is sunset.

When questioned as to what the law was, the hunters claimed that they thought they could shoot until 30 minutes after sunset. When asked why they continued to shoot another 15 minutes past that time, they explained that they did not know when sunset was because there was no sun for them to tell what time it was.

ILLUSTRATED BY JACKIE PITTMAN

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $ _____. *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ Lifetime Magazine Subscription to *Wildlife in North Carolina*. $150
(Please allow up to 6 weeks for your subscription to begin.)

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

MLIFE7

Make checks payable to: *Wildlife Endowment Fund*

A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

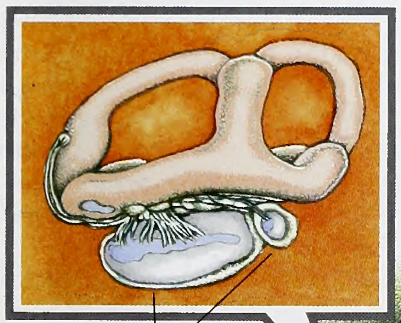
Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

How Do American Shad Hear?

written by Clyde Sorenson
illustrated by Jim Brown

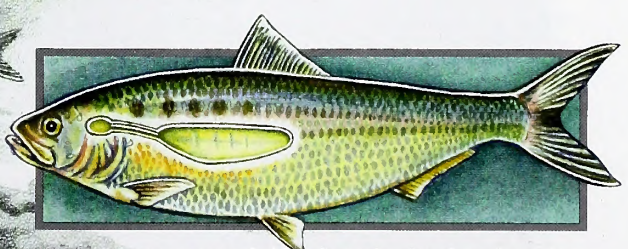
AMERICAN SHAD MAY HAVE better hearing than any other fish, and this remarkable ability helps them avoid predators such as dolphins. They have three different systems for sensing vibration in their environment.



otoliths

The shad's ear contains tiny mineral structures called otoliths, supported by sensory hairs. Vibrations cause the otoliths to move out of sync with the fish's ear, stimulating the sensory hairs.

Unlike many other fish, the shad's lateral line system is restricted to its head. It consists of a fine network of water-filled channels; vibrations set up pressure waves in these canals, and differences in these pressure waves inform the fish of the direction of the vibration's source.



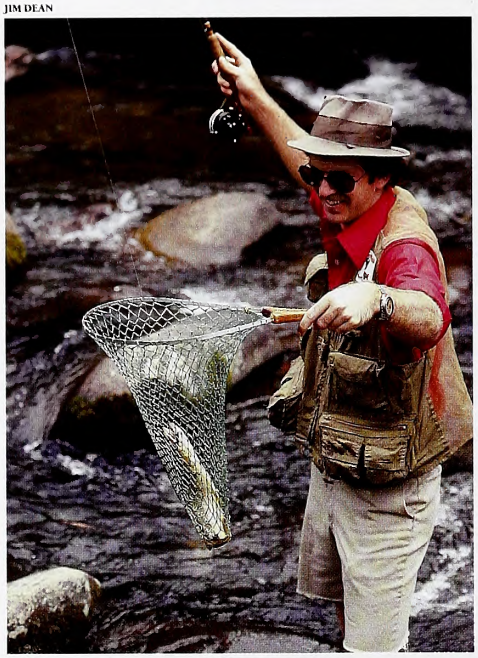
Perhaps the most remarkable adaptation involves the swim bladder. Most fish can detect some vibration through their swim bladders because pressure waves move differently through water, fish flesh and the air in the bladder, creating detectable vibrations. In shad, two narrow extensions of the swim bladder reach up into the brain where they expand into an air-filled cavity. Vibrations in this cavity stimulate highly sensitive, adjacent ear structures. This system allows shad to hear the ultrasonic clicks dolphins use to echolocate their prey—sounds nine times higher than any we can hear!

Fly-Fishing's Recent Past

written by Jim Dean

While cleaning out my basement this winter, I ran across a cache of long-abandoned fishing tackle. There was a pair of moldy tennis shoes that had remnants of shag carpet glued on the bottoms, a decrepit felt hat, a short glass fly rod built on a $4 Herter's spinning rod blank, a cheap skeletal fly reel with sticky silk line, a dozen or so primitive moth-eaten flies in a Prince Albert tobacco can and several gut leaders in a thin aluminum box. The only item missing was a 7 1/2-foot bamboo fly rod that I'd bought for $40 while stationed in Pennsylvania, almost a week's pay for an Army lieutenant. That rod was stored in a closet upstairs.

JIM DEAN



Tom Cooper in 1974

This was not, as you might think, stuff that had once belonged to an ancestor, but the tackle I first used in the early 1960s. Out of mutual poverty, my fishing buddies and I had made much of our gear. Quality tackle was not widely available even if you could afford it. Good wading shoes were virtually nonexistent, and very few glass fly rods shorter than 8 1/2 feet were made (except the pricey 7 1/2-foot white glass Shakespeare President series). The smallest designation fly line was 5-weight, and many were silk. Because monofilament was new, some fishermen still used gut leaders stored between felt pads soaked in glycerin (4X was the smallest tippet available). To make gut pliable enough to tie a knot, you further soaked it in your mouth en route to the stream, and it was best not to consider that it came from cats (feline chitterlings, so to speak).

"Out of mutual poverty, my fishing buddies and I had made much of our gear."

Yet with this primitive gear, we successfully fished on such storied Pennsylvania streams as the Letort and Yellow Breeches, and on Big Hunting Creek in Maryland (where I caught my first trout).

When I returned home to North Carolina in 1964, I encountered a culture of fly-fishing for trout that was barely beyond infancy. Only one sporting goods store (in Asheville) stocked more than a few fly-fishing items for trout—most of us ordered them from catalogs. One chapter of Trout Unlimited existed in the state (founded in 1961 with eight members).

Given the current popularity of fly-fishing, it is hard to imagine how recent this phenomenon is. Fly-fishing for trout dates back at least 600 years, but its popularity and improvements in tackle have advanced at a glacial pace until very recently.

Even so, in the 1960s, North Carolina established what were then the nation's most advanced regulations designed to promote wild trout (considerably revamped since then). Originally, portions of 24 mountain streams were designated as native or trophy trout waters. Twenty native streams were open three days a week and restricted to fishing with either single-hook lures or flies. The daily limit was four trout at least 10 inches long. Four trophy streams had a seven-day, daily limit of one trout 16 inches or longer and a single-hook restriction; however, fishing on Lost Cove Creek was further restricted to flies only. The first, and only other, flies-only trout water in the nation was Fly Fisherman's Paradise on Spring Creek in Pennsylvania.

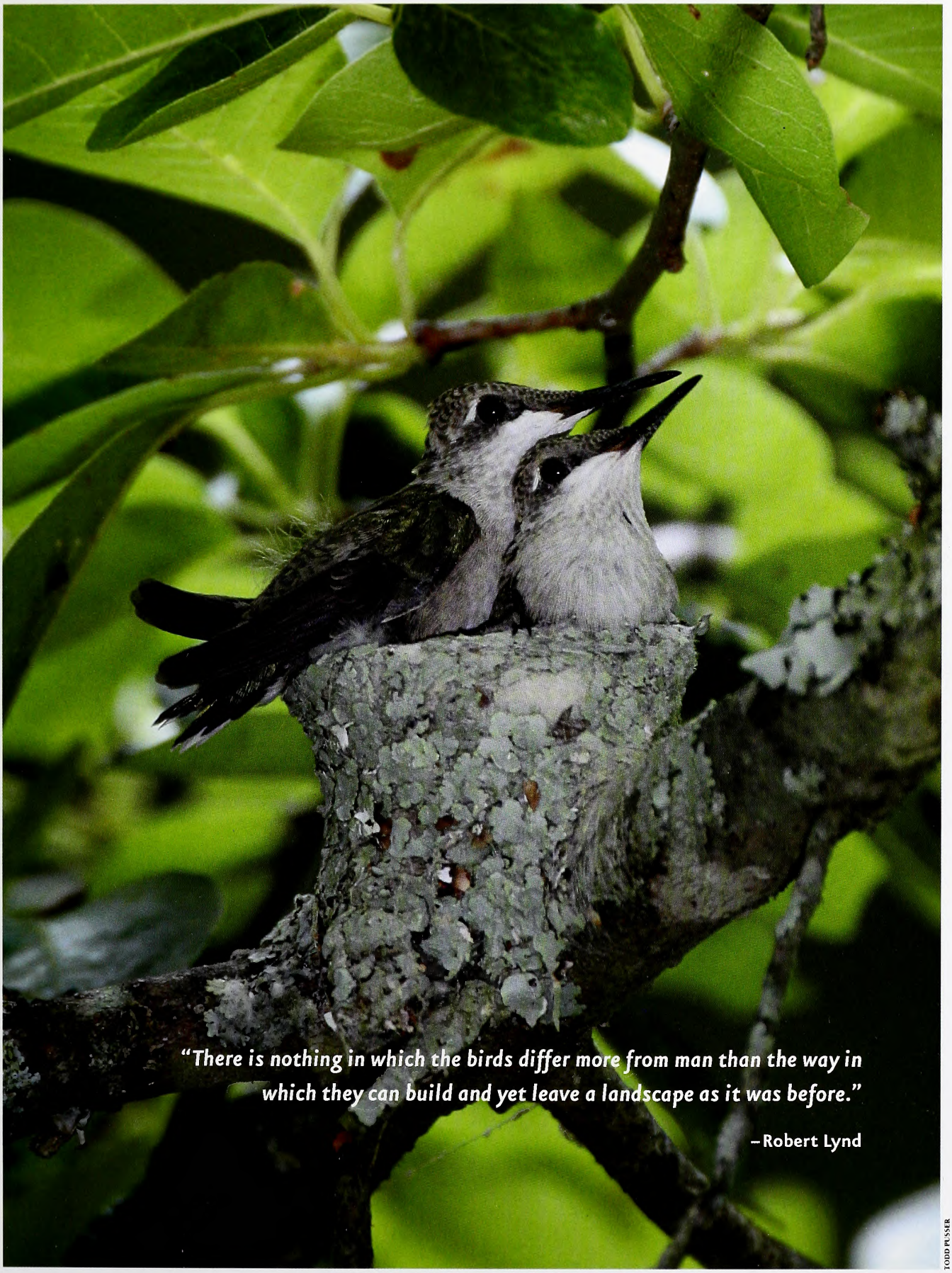
Through the late 1960s and '70s, it was not unusual to be able to fish all day on these native and trophy waters without encountering another fly-fisherman, even sometimes on opening weekend.

This is not to suggest that no fly-fishing occurred in the Southeast before mid-century. Fly rods have been used here since before the turn of the century to catch bass and panfish, although bugging declined markedly when soldiers returning home after World War II introduced the spinning reel from Europe.

Interestingly, the Cherokee Indians were reportedly catching native brookies using "flies" made of deer hide (with the hair left attached) when the first settlers arrived. Also, visitors to our mountains before the turn of the century used fly rods in our streams, though mostly with natural bait. Through the 1940s, a growing handful of pioneering mountain locals fished with flies, among them Mark Cathey of Bryson City, Cap Weise of Patterson and A. J. Johnson of Winston-Salem (who originated the two-fly tandem rig so popular today).

Yet, even as late as 1960, fly-fishermen pursuing trout in North Carolina were a decided minority and virtually no one here fly-fished for shad, stripers or saltwater species. Joe Brooks pioneered those sports in his 1950 book, "Salt Water Fly Fishing," but it was not until the early 1970s that a few fishermen began chasing saltwater species along our coast with fly rods.

Indeed, the real boom in fly-fishing has occurred over the past 20 years, driven by rapid improvements in tackle. I keep thinking what my old friend Johnson would say if we could get him hooked up to an albacore on a modern 10-weight.



TODD PUSSER

OUTDOOR MOMENT

Juvenile Ruby-throated Hummingbirds

IN THE JUNE ISSUE

JACK DERMID

NATURE'S DESIGNS

Get ready for our 2007 photo competition by studying the work of Jack Dermid, one of the state's best nature photographers.

WHIP-SMART

Piercing calls and folk tales aside, the birds known as nightjars are fascinating, likeable creatures with many odd behaviors.

EYE ON THE REDEYE

The Roanoke bass, found in only a handful of Piedmont rivers, holds the oxymoronic distinction of being a rare game fish.

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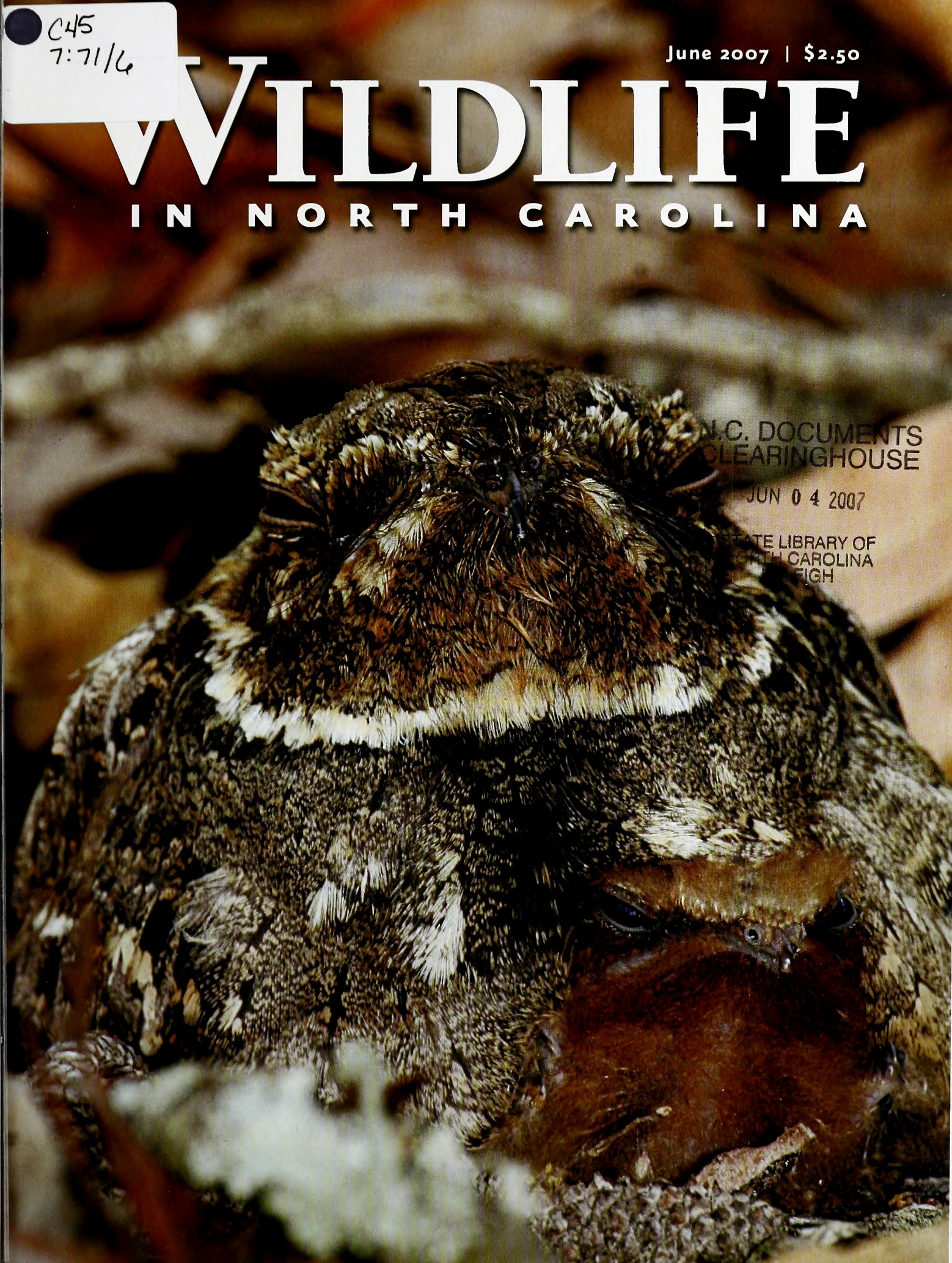

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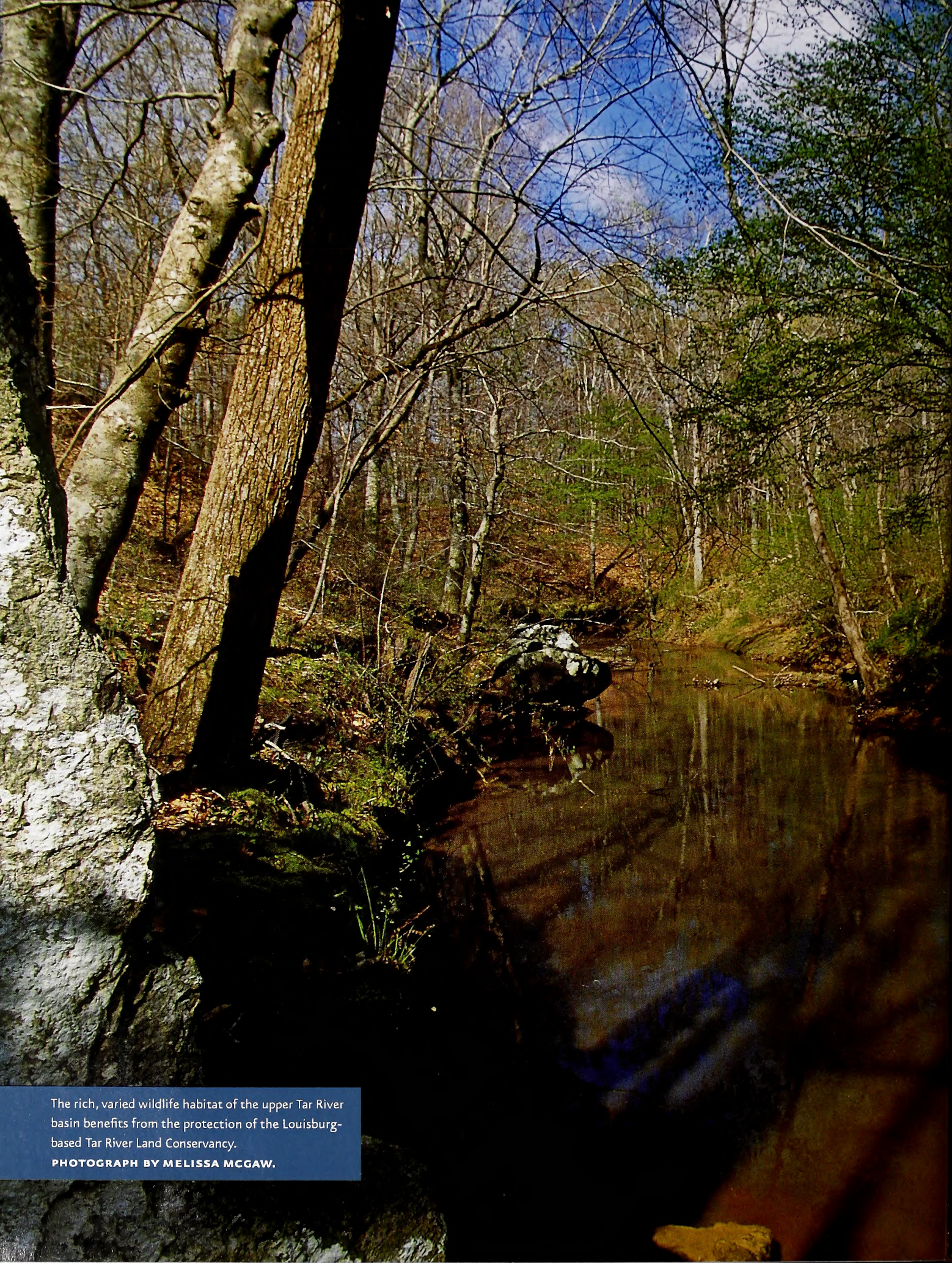

The rich, varied wildlife habitat of the upper Tar River basin benefits from the protection of the Louisburg-based Tar River Land Conservancy.
PHOTOGRAPH BY MELISSA MCGAW.

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Cover: In an amazing display of natural camouflage, a chuck-will's-widow hen and her chick blend perfectly into their ground nest — and one another. PHOTOGRAPH BY TODD PUSSER.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

June, how do I love thee? Let me count the ways (with apologies to 19th-century poet Elizabeth Barrett Browning)...

- I love thy late-spring warmth that alloweth outdoor frolic in shorts and T-shirt.
- I love thy fishing, in mountain streams that numb one's toes, on Piedmont lakes not yet awash in summer's torpor, in coastal waters teeming with bounty.
- I love thy hiking, on trails and paths in parks and forests across the breadth of the goodliest land.
- I love thy summer solstice, days so lengthy as to pack many adventures within.

JACK DERMID

Like Browning's original verse, June is full of beauty and promise. In many ways, it is the most obvious of months because so many people and creatures are out and about. But not everything reveals itself in June.

In this issue, we focus on the less-obvious joys of June, such as the unique family of birds known as nightjars ("For the Love of Goatsuckers," page 4). Apparently believing that it is better to be heard and not seen, nightjars will call incessantly, but their camouflage allows them to hide in plain slight on the forest floor.

Like some of the noisy nightjars, Roanoke bass are found only in one specific type of habitat in a relatively small area ("Gem of the Piedmont," page 26). The fish shares a nickname ("redeye") with a similar-looking species, the rock bass, for which it is sometimes confused. And while it is a game fish, the Roanoke bass has been studied so little that biologists don't yet know whether the species is plentiful or threatened within its limited range.

In the 1950s and '60s, outstanding nature photographer Jack Dermid's work was ubiquitous in this magazine. We are proud and pleased to feature pictures Dermid took during his search for patterns on both a macro and landscape scale ("Design in Nature," page 20). Such designs are not always obvious, but we hope highlighting them in this issue will, as Jack says, add pleasure to your June adventures.

Greg Jenkins

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JUNE 2007 VOLUME 71, NUMBER 6

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Cracking Open Memories

My grandfather, whom I called Papa, died in 1940 when I was 12 years old, but my few years with Papa were memorable. Your article "The Passing of the Chinquapin" (March 2007) brought back one of those memories. Papa always had a bag of peach blossom candy, hickory nuts and chinquapins in his pocket. He would sit down, crack those nuts and hold them in his hand for me to eat. I have no idea how he cracked them without a hammer. All the while, he had a smile on his face and a twinkle in his beautiful blue eyes. Only he knew where to find those hickory nuts and chinquapins. Thanks for the memories.

Joyce Johnson
Williamston

I want to thank Pat Garber for her article on chinquapins and chestnuts. As a boy in Hendersonville, I remember a chestnut tree that grew not far from my home. It was a stately tree mixed in with oaks and other hardwoods. Little did I know that the tree was faced with a blight that would eventually take it away. I used to make frequent trips to the tree, especially during nutting season. When it finally succumbed, I felt I had lost a friend.

I am happy to learn there are still some of these trees scattered throughout the woods. It's wonderful that the chinquapin and chestnut are being reintroduced in the forests. Bless all who are working on this endeavor to replant them. May I suggest we work with the North Carolina and Georgia forest services, as I believe there is already a tremendous plateful before the U.S. Department of Agriculture.

William C. Meekins Jr.
Atlanta

I was interested in your March article about the chinquapin because I have four of these trees in my back yard. A friend helped me identify them a few years ago, and I still didn't know their importance until I read your story. Now I can't wait until the chinquapin nuts are ready to harvest so I can try the recipes on page 31.

Tim Farmer
Zebulon

I looked forward to your March article on chinquapins, hoping to be able to identify a tree in the yard of my Ashe County home. The tree is 30 feet high and very healthy. My husband, a North Carolina mountain boy, thinks it is a chinquapin. A friend retired from the U.S. Forest Service thinks it is a chestnut. I just want to know what we have, so I have enclosed a bur from my tree. Either way, it is an amazing tree. For several years I have used the fruit in my Christmas decorations.

Anita Pangle
Charlotte

The magazine staff had fun trying to identify the bur that Anita sent us. It was round and about 3½ inches in diameter, with a dense array of spines. Unable to pop it open with a knife, we cracked it with a hammer. Inside were one half-formed and two fully formed nuts. Based on the information available at The American Chestnut Foundation's Web site, it appeared to be either an American or a Japanese chestnut. TACF offers a chestnut identification program much more reliable than sending nuts to the nuts here at WINC. Send a clipping of a twig and leaves to a regional office in your area, and a foundation expert will identify your tree. Visit the "Find a Tree?" section of www.acf.org for an address and instructions for sending, or call The American Chestnut Foundation at (802) 447-0110.

Tying It All Together

Mark Joyner's article about knots, "Fit to Be Tied," in the March 2007 issue is a fit piece of writing, and thank you for publishing it. The article is to the point, clear and concise, with practical applications, good humor and wordplay, and with many examples of the importance and history of knot-tying. I especially like Mr. Joyner's references to the prehistoric use of knots still commonly tied today, such as the sheet bend and clove hitch.

When you think about it, today's world is largely held together by nails, bolts, screws and glue. But prehistoric people, whether they were building a house, an animal trap or a birch bark canoe, held their world together with cordage, vines, roots, sinew and leather straps fastened with knots, lashes and hitches. And as soon as modern man heads back in the direction of a primitive existence by going camping, canoeing, fishing or backpacking, as Mr. Joyner suggests, he also starts tying his world together again, though it may be with parachute cord. Depending on whether or not an outdoorsman knows his knots, life in the wilderness can be a knotty problem ... or not.

Burt Kornegay
Slickrock Expeditions
Cullowhee

A Bit of Grousing

The article by Clyde E. Sorenson ("Burt Spiller Sold Me a Bill of Goods," Feb. 2007) brought back a memory of my first and last grouse hunt near Canton in the most rugged country I ever walked. Having grown up in middle Tennessee an avid duck, squirrel and rabbit hunter, I was unaccustomed to such terrain. My friends took it upon themselves to teach this newcomer a lesson. My experience was identical to that of these college lads. My seasoned hunting companions wore me out and that day I promised myself to stick with duck hunting.

Sam McGuire
Nashville, Tenn.

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For the Love of Goatsuckers

NORTH CAROLINA'S THREE NIGHTJAR SPECIES ARE BIRDS WORTH LOSING SLEEP OVER.

It was too dark to see the clock, but I was pretty sure it was 5 a.m., give or take about three minutes. The creature shrieking to shame a banshee outside my bedroom window was nearly as punctual as he was vocal. From atop the privacy fence immediately outside, he'd call a few times just after dark, then move away from the house for several hours, only to return at 5 o'clock sharp.

There was no sleeping through it. I could shine a flashlight on him through the window, but he'd ignore it, continuing to whoop with his head thrown back and his mouth open wider than I'd have thought possible. Lots of folks have heard whip-poor-wills call, but watching one do it is nothing shy of spectacular.

Written by Jeff Beane & Photographed by Todd Pusser

Whip-poor-wills belong to an order of birds collectively called nightjars, after the fact that the loud, melodic cries of most species "jar" the night's otherwise relative stillness. Voices aside, nightjars are poorly known. They're also called goatsuckers—a name stemming from a European folk tale maintaining that they steal milk from goats. This ancient myth probably originated from the fact that European nightjars would often forage for flying insects over herds of goats or other livestock. Nightjars may also have provided at least some inspiration for Latin American folklore's *chupacabra*—a nocturnal terror reputed to suck the lifeblood from hapless goats (or humans).

The names of the order (Caprimulgiformes), family (Caprimulgidae) and largest genus (*Caprimulgus*) of nightjars derive from Latin roots meaning goat milker. More than 80 goatsucker species occur worldwide. They are closely related to owls, with which they share similar DNA, nearly identical feather structure, large heads, huge eyes and primarily nocturnal habits. But, unlike owls, nightjars have tiny, weak feet; greatly reduced bills (one ornithologist remarked that a nightjar's bill serves mainly to hold its nostrils in place); and quite different behaviors. They eat mostly flying insects, which they scoop up in their enormous mouths.

THE SPECIES IN NORTH CAROLINA

Of the eight North American nightjar species, three occur in North Carolina. The whip-poor-will (*Caprimulgus vociferus*) is the most familiar. Though seldom seen, the bird has a namesake song, audible for up to half a mile, that is a familiar summer night sound in Eastern woodlands, including most of North Carolina. Male whip-poor-wills on breeding territories are nothing if not enthusiastic. The 19th century naturalist John Burroughs (evidently with time to burn one night) reported a bird that called 1,088 consecutive times in an hour, then (after a half-minute pause) another 390 times.

Whip-poor-wills figure prominently in folklore. One superstition equates the number of calls heard to the number of years a person will remain unmarried; another holds that wishes made on the year's first calls will come true. Other accounts regard whip-poor-wills as death heralds with the ability to capture dying souls. Some American Indian cultures considered the birds omens of successful hunting or fishing. References to them turn up everywhere from H.P. Lovecraft's horror fiction to the lyrics of songs by such artists as Randy Travis, Alan Jackson, Vince Gill, Rhonda Vincent, Jim Croce and Elton John.

Also onomatopoeically named, the slightly less familiar chuck-will's-widow (*C. carolinensis*) is larger and more rufous brown, with longer, pointier wings than its better-known relative. Birders often call the two species whips and chucks for short. Their ranges overlap, but the chuck is more southerly in distribution and more closely associated with (though not limited to) pine

Goatsuckers, such as this whip-poor-will (below), blend seamlessly into the duff of the forest floor, making them all but invisible. The whip does not build a nest, but merely lays her camouflaged eggs on the ground. Chuck-will's-widows are more skittish than whips and may sometimes roost in trees (opposite).

Voices aside, nightjars are poorly known. They're also called goatsuckers—a name stemming from a European folk tale maintaining that they steal milk from goats.

forests. In North Carolina, it is most common in the Coastal Plain (there are chucks around my home, too, but they hug the forest edges behind the house, seldom disturbing my sleep). Those unfamiliar with chuck-will's-widows frequently mistake them for whip-poor-wills. The soft "chuck" note is sometimes inaudible, especially at a distance.

Our third nightjar, the common nighthawk (*Chordeiles minor*), is an aberrant and inaptly named species. Not a hawk, it may fly at night but more often forages at dusk and is frequently diurnal. Each of its long, pointed wings has a bold white bar across the primaries. A nighthawk's call—a buzzy "*peent!*" or "*beard!*" reminiscent of a woodcock's courtship call—is given in flight. Males in courtship also produce a sound rivaling the calls of their nocturnal relatives in loudness and exceeding them in strangeness, though its origin is mechanical rather than vocal. This sound, a remarkable, booming "*hoooorv!*" is produced by air rushing through the flight feathers as the bird folds its wings while plummeting earthward. I can't tell you how many startled expressions I've seen on the faces of people hearing that sound for the first time. I've known folks to mistake it for everything from a bear to an airplane breaking the sound barrier to Bragg artillery. The sound,

Nightjars share a number of characteristics. Each, like this nighthawk (above), will feign a wing injury to distract a predator from her chick. Each has a huge mouth for catching flying insects. Nightjars are also frequent victims of vehicles (far right).

together with the bird's erratic flight, perhaps gave rise to the colloquial name bullbat.

Whips and chucks are mostly nocturnal sit-and-wait predators, usually leaping from the ground or a low perch to snag flying insects. They may also pounce on terrestrial prey. Individuals or populations may specialize on particular prey items. Whip-poor-wills at my friend John Kelly's study sites on Cape Cod, Mass., eat almost exclusively moths and scarab beetles. Chucks often take large moths and have even been known to consume small birds, bats and amphibians. I first learned to appreciate the size of their cavernous mouths while examining a skull that my late friend Paris Trail kept on his kitchen table. Both species have rictal feathers—specialized, bristly feathers resembling whiskers—around their mouths. These may help them detect, catch and maneuver prey, as well as protect their eyes from scratchy insect appendages.

Nighthawks always feed on the wing, often foraging high in the air. Their rictal feathers are greatly reduced; food items are taken directly into the mouth, traveling straight down the hatch at impact speed. Deprived of flight, a nighthawk soon starves; wildlife rehabbers treating injured ones must usually force-feed them. The birds feed somewhat selectively, often taking smaller insects than do whips or chucks. Mosquitoes and flying ants are frequent prey. One nighthawk's stomach contained 2,175 winged ants.

NESTING HABITS

Nightjars build no actual nests but deposit two superbly camouflaged eggs directly on the ground, often in very inconspicuous places. Nighthawks will also nest on flat rooftops, including those of skyscrapers. Graveled roofs are preferred. This habit has enabled them to adapt to cities and become familiar to many urban residents. A nighthawk surprised on its nest may raise its wings, gape open its mouth and hiss. All three species may feign wing injury—a ruse made famous by the unrelated killdeer—to lure potential predators away from their nests. If you see this behavior in a nightjar, it's usually best not to search for the nest—you'll likely step on the eggs before ever seeing them. Goatsucker eggs require about 20 days to hatch. Chicks are semi-precocial, fledging in 10 to 20 days.

Odd behaviors abound in nightjars. At least one species—the common poor-will of the western United States—actually hibernates in winter. North Carolina's three species all migrate, leaving by late September for Mexico or Central or South America. Some chuck-will's-widows winter in peninsular Florida, and a few may linger farther north. Rarely, a stray whip-poor-will or nighthawk turns up in the Carolinas during winter, but normally the birds return around late March or early April and soon begin staking out territories. The earliest I've heard a whip-poor-will in the state was on an unseasonably warm March 5 in southern Moore County.

Nighthawks, especially in late summer, may gather in large flocks, or kettles, to feed. I happily anticipate such gatherings each year.

One evening I approached my yard from a distance to find a virtual cloud of them swirling directly above the house like huge bats. Such an ominous spectacle might have led to accusations of witchcraft in some earlier time.

Beautifully camouflaged, whip-poor-wills by day will sit motionless nearly to the point of being stepped on. Chucks are more skittish, usually flushing readily. Both typically roost on or near the ground, though chucks may also use trees. Nighthawks often prefer trees as well, usually sitting lengthwise on limbs—a strategy providing stability for the weak-footed bird as well as great camouflage. Roosting nightjars truly resemble bumps on logs. At night, their large eyes shine red or orange because of light reflected by their *tapetum lucidum* (a reflective layer of cells behind the retina, common in nocturnal animals). One can sometimes approach them with a light close enough to touch them.

All three species habitually sit on roads, and many are killed by vehicles. One night, as I rode through southern Moore County with my good friend Todd Pusser, who photographed this article, a chuck-will's-widow materialized on the pavement directly before us. I barely had time to cry "Whip!" before the bird flew up and into the front of Todd's vehicle. Certain it was hit, we went back to look for it but couldn't find it anywhere along the road. Finally, we spotted eye shine inside a small, round opening between the grill and front bumper. Somehow the bird had been sucked into that hole, suffering only a broken wing.

Once we extracted it, we put it in a dark box pending a trip to a wildlife rehabilitator the following day. Feeding the bird in the meantime was easy; it would gape defensively whenever we approached, and crickets dropped into that chasm never saw daylight again. Still, nightjars rely so heavily on their wings that I wouldn't have bet on its prospects. Todd was even less hopeful when the rehabber initially remarked, "Oh, it's a young bird—see, it's begging for food." But evidently ignorance of bird age or behavior doesn't necessarily negate the ability to treat injured ones, for the wing did mend, and the chuck was later released.

AN ODD LOT OF BIRDS

The list of nightjar anomalies runs on and on. Each of their middle toes has a pectinate claw with a serrated inner edge. Most ornithologists believe this "comb" is used primarily for grooming, but it could also provide some traction in the otherwise weak feet.

At least some nightjars routinely excrete an unpleasant-smelling, brownish liquid, quite unlike their usual droppings. The substance appears analogous to the "caecal droppings" of grouse and some other birds (see Nature's Ways, February 2007) that ingest cellulose. Goatsuckers (except for the bizarre South American oilbird) don't eat plant material, so logic dictates that they shouldn't need caeca at all, but they have them just the same. The few ornithologists speculating on the subject have suggested that their caeca may help them digest chitinous insect exoskeletons.

Years ago, a man used to call me at the N.C. Museum of Natural Sciences periodically to complain about whip-poor-wills keeping him awake. He was blind, he said, so his hearing was ultra-sensitive to compensate, and the birds drove him nuts. He sought advice on how to keep them away from his yard, his temporary remedy being to fire shots in their general direction.

There's more than one reason to lose sleep over nightjars. Though population surveys for them can be tricky (many factors, including moon phase, can greatly affect their detectability), most recent monitoring efforts suggest declines. For forest-loving whips and chucks, that's hardly surprising, but even the citified nighthawk has suffered. Reasons for this could include pesticides; increasing numbers of roads, vehicles and power lines; replacement of gravel rooftops with rubber membrane; burgeoning populations of urban predators such as cats, crows and gulls; or factors the birds encounter in their winter range. Fire suppression might be harming some nightjar populations. So might fire ants.

The whip-poor-will outside my window may only be announcing his territory, which overlaps mine, but I imagine he also could be punishing me for taking his lot for granted. Only after beginning this article did I recall the richness afforded my life by even the simplest goatsucker encounters. Camping under the stars with whip-poor-wills calling. Flushing chuck-will's-widows off their nests. Hearing the dive-booms of nighthawks on hot afternoons. Watching a pair of chuck-will's-widows harass a large copperhead on a Harnett County road. Glancing into the canopy of a Brunswick County savanna to miraculously spot a nighthawk motionless on a longleaf limb. And being fortunate enough to own a little patch of ground in the Sandhills where I can see and hear all three of our goatsuckers in my own yard.

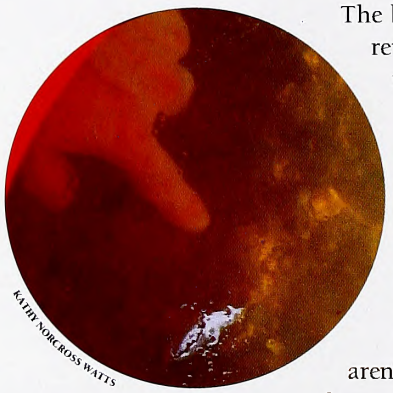
If I'm to have rude awakenings, I'm glad when they can be attributed to what is, after all (at least from a distance), one of my favorite night sounds—a cry that constantly reminds me of the importance of territories, of the exuberance that life ought to evoke in all sentient beings and of the fact that I probably need to get out of bed anyway. ◆

Jeff Beane is a herpetologist with the N.C. Museum of Natural Sciences.

Coordinating

THE TAR RIVER LAND CONSERVANCY WORKS TO PRESERVE THE DELICATE BALANCE OF NATURE IN THE PIEDMONT BY PROTECTING THE RIVER'S UPPER BASIN.

I'D HAVE NEVER SEEN IT. I MIGHT HAVE STEPPED RIGHT ON IT, IF NOT FOR AN N.C. WILDLIFE RESOURCES COMMISSION BIOLOGIST AND WHAT LOOKED LIKE A BIG ORANGE MAGNIFYING GLASS.



KATHY NORCROSS WATTS

We were standing in the Tar River where it makes its way through Granville County. The biologist's magnifier (photo at left) revealed a silt-covered mussel sticking up about 2 inches, filtering the flow above its home in the sand just behind a rock. Nearby in Shelton Creek, a major tributary of the Tar, the shell of another mussel lay open, likely the victim of a battering as it tumbled beneath a bridge that forced the current into a fury.

History reports that these mussels aren't too tasty, even if you boil them for days and dunk them in butter. They're important nonetheless, according to my companion, Rob Nichols, who is the eastern aquatic nongame research coordinator for the Wildlife Commission.

These common mussels filter water from the river day in and day out, and they'd be the first victims of sediment, sewage spills and nonpoint-source pollution, he said. The fact that they thrive here, along with 23 other mussel species—14 of which are on rare and endangered state and federal species lists, including the dwarf wedge and the Tar River spiny mussels—proves just how unique this basin is.

Preserving the landscape that sustains such diversity is the purpose of the Tar River Land Conservancy (TRLC). The nonprofit works on a watershed basis at a grassroots level to preserve farmland and natural habitat that filters runoff before it reaches the river.

Staff members help farmers and other landowners maneuver through state and federal regulations and incentive programs to find ways to keep their land in its natural state. Often they find funding to do so along the way. The land trust is funded by gifts from individuals and businesses, as well as grants and contracts.

"TRLC's mission appeals to a lot of people," Executive Director Derek Halberg proudly stated. "We're responding to the conservation ethic that landowners and farmers in these communities have by helping link up those with the land with the tools and financial benefits that are there to create the long-term protection."

A CONSERVATION NEXUS

In its first seven years, TRLC has helped landowners protect 7,850 acres and 425,000 stream feet—just over 80 miles—in the Upper Tar River basin, which includes parts of Person, Granville, Vance, Warren, Franklin, Halifax, Nash and Edgecombe counties. An increased demand from area landowners for the assistance TRLC provides has led it to help with additional projects outside the basin boundaries within the counties it serves. The group has set a goal of protecting at least 15,000 acres by the year 2010.

"We help them achieve the means of keeping farms together as farms," Halberg said. "We help them find the financial benefit that we know is out there.

WRITTEN BY
KATHY NORCROSS WATTS

PHOTOGRAPHED BY
MELISSA McGAW

Conservation on the Tar

"What makes us different from governmental agencies," Halberg continued, "is that we have the ability to work with the landowner and look at all the incentives that are out there." Another important detail about TRLC, he said, is that "we're local."

NCWRC

NCWRC

TRLC began in 1998 with a group of concerned landowners. Their timing was fortuitous, because conservation efforts began before much of the urban growth in these rural communities. "The resources are there," Halberg said. "We know the pressure is coming."

In recent years, the region has experienced unprecedented growth, particularly south of the river, and the landscape has begun to change because of the tobacco buyout, as farm families have struggled with what to do with their land.

"It's easier to protect it than it is to go back and fix it," said Travis Wilson, eastern N.C. DOT permit coordinator for the Wildlife Commission, who has seen TRLC at work. "They're very proactive; they do a good job with the landowners."

HOW IT WORKS

The conservation easement is one of the primary ways that TRLC can preserve lands with conservation significance, and it also often offers financial incentives to landowners, according to Halberg. Such benefits may come from tax savings or, in some cases, cash payments, depending on the property. A conservation easement will help guide the management of the property for many generations. In addition, a 2006 change in the Pension Protection Act allowed for greater deductions for farmers who place land in conservation easements,

(continued on page 14)

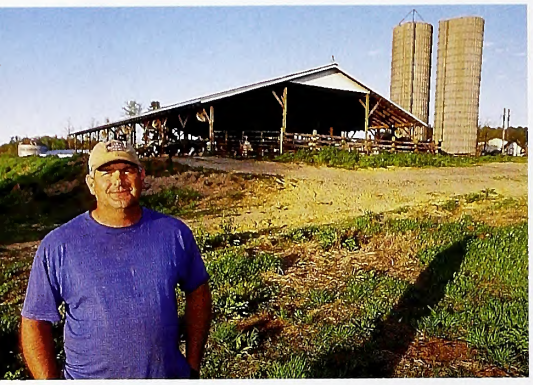
Randy Guthrie and Derek Halberg discuss land conservation (top, left). The spiny-mussel and the spiny crayfish (top, middle and right) are just some of the species that thrive in the Upper Tar (right).

MAYO RESERVOIR
JOHN H. KERR RESERVOIR
GRANVILLE COUNTY
Roxboro
PERSON COUNTY
Oxford
Henderson
Currin Farm
Guthrie Farm
VANCE COUNTY
Shocco Cr
Tar
Brittain Property
Sandy Cr
BUTNER-FALLS OF NEUSE GAME LAND
FRANKLIN COUNTY
Joyner Park
Louisburg
Cedar Creek
River
DURHAM COUNTY
FALLS LAKE
WAKE COUNTY
jbrown

LEARN ABOUT EASEMENTS

Each spring, the Tar River Land Conservancy holds a daylong workshop to educate landowners about the financial benefits of conservation easements. Speakers include attorneys, accountants and financial advisors knowledgeable about private land conservation. There are also opportunities to talk with landowners who have set up easements with the help of the conservancy. For more information, call (919) 496-5902 or visit www.tarriver.org.

ILLUSTRATION BY JIM BROWN Source: Tar River Land Conservancy



Guthrie and Halberg (top) discuss the easements on his property. Currin (second from top) sought help from the TRLC on his dairy farm. Mary Ann Brittain is shown (third from top) in a prairie she cultivated with native grasses and wildflowers. Retired Louisburg town manager C.L. Gobble (above) worked with the TRLC to help protect the river.

BRITTAIN PRAIRIE IN BLOOM, FRANKLIN COUNTY

TRLC

(continued from page 11)

he said. The change was set to last through the end of 2007, but legislation is being considered to extend that deadline.

TRLC staff identify properties with the highest conservation value. They use advanced Geographic Information Systems analyses and tax records to focus their efforts on areas of significant habitat for plants and animals, on streams and creeks and rivers that provide drinking water, and on soils that are particularly good for farming.

Their first meetings with farmers may take place across a kitchen table or on the hood of a pickup truck, and the process ends with the signing of final documents with an attorney. "To do conservation on the scale that we're doing it, parcel by parcel, you really have to have the local contacts to get the doors open, to be able to establish and keep the support of the landowners, and to be able to spend the time it takes to be successful," Halberg said.

Another key to the TRLC's success has been its ability to tailor the easements to accommodate what the landowner wants as well as what will benefit the river. For example, a farmer may still farm or harvest timber in portions of his easement. An easement does not mean that public access must be granted, but it does mean that the property will be protected indefinitely. Often, landowners agree to leave a 300-foot undisturbed buffer adjacent to the river and creeks.

THE LANDOWNERS

Trees stand so thick on Randy Guthrie's property that he must reach out of his truck window and push a limb up over the cab to navigate his dirt road, one dotted with potholes that he has filled with old bricks from the Oak Hill Teachery in Granville County. Guthrie bought his 304-acre farm in 1993, and it holds 15,000 feet that border the Tar River and Shelton Creek, one of its major tributaries. "It's just a resource that needs protecting," he said.

As it flows past his land, the river holds the federally endangered dwarf wedgemussel and the Carolina heelsplitter and a little fish, the Carolina madtom, which looks like a small catfish. For several summers now, he's seen an otter family swimming and peeking from beneath downed trees in the water.

Guthrie worked with TRLC to place part of his property in three different easements, two of which he was paid for and one of which he donated and received tax benefits. "They worked to do their best to get the best deal for the landowner," he said.

In certain portions of the easements, Guthrie can harvest timber and farm tobacco if he wants. He has agreed to leave 300 feet in a permanent undisturbed buffer along the river and Shelton Creek. Receiving financial benefits from the easements on his land has enabled him to manage the farm more effectively for wildlife.

Having contiguous tracts of natural habitat is important, according to Mary Ann Brittain, director of the Prairie Ridge Ecosystem for Wildlife Learning for the N.C. Museum of Natural Sciences. Creating small parks, for example, results in more edges, she said. Cowbirds live along those edges, laying their eggs in warbler nests and tricking those mothers into raising the cowbirds' young instead of their own. Larger tracts reduce those edges, she continued.

Brittain and her husband, Bill, placed 37 acres in easement along Lynch Creek in Franklin County. Their agreement protects a riparian buffer along the west side of Lynch Creek and precludes timber harvest, construction of subdivisions and roads, mining, signage, and dumping. It allows one or two homesites somewhere in the acreage, Brittain said, but they are not tied to a specific location. The couple built a house on the property in 2001, and it overlooks a prairie Brittain cultivated with native grasses and wildflowers. She often sees blue grosbeaks, summer tanagers, woodcocks, bluebirds, titmice and chickadees. Her favorite bird is the indigo bunting. She hears cuckoos and prairie warblers and finds an assortment of frogs. Eleven species of amphibians breed in her pond, Brittain said.

TRLC helped her navigate the legalese necessary to protect the property. "They did a good job holding my hand," she said. "It is a great feeling to know that in perpetuity this will be protected."

Benefits extend beyond protecting the river and preserving wildlife habitat. Guthrie, a retired superintendent from the Butner Beef Cattle Field Laboratory, believes that each generation has become further and further removed from where and how food is raised. Preserving farms as farms is important, too, he said.

Granville County dairy farmer Charles Currin agreed. "It's hard to see land you've been farming and working all your life just turn into a building path for a subdivision," Currin said. Like Guthrie, he sought help from TRLC.

"All of us like to think that we're going to leave something behind that others will enjoy," Guthrie said. "All of us have a responsibility to try to make the world a better place."

PRESERVATION PARTNERS

The N.C. chapter of The Nature Conservancy decided early on to partner with TRLC and provide seed money, said J. Merrill Lynch, assistant director for protection for The Nature Conservancy.

Freshwater ecosystems are impaired all over the country, Lynch noted, and a nationwide analysis found that the Tar River was one of the most important watersheds in the eastern United States, not only because of species diversity but also because of the potential for success.

"In the Upper Tar, we're at a point in time where we can actually effect good conservation," Lynch said. "In terms of a working entity, TRLC is doing the work in the Tar River basin, so we don't have to. We have different strengths that we can bring to the table. . . . It's so important to have people living in the community who are out there on the land every day who know the landowners."

Louisburg town manager C. L. Gobble, who retired in March after 26 years of service, has worked with TRLC for years because the river is critical to the town. In fact, the town of Louisburg exists because of the Tar River, according to Gobble. "It was a place to mill the corn; it was a place to trade," he said. "It's our source of drinking water."

TRLC did much of the legwork and research that enabled Louisburg to obtain a $250,000 Clean Water Management Trust Fund grant that helped build a town park along the riverbank. "The bottom line," Gobble said, "is that by forming this larger team with common goals, we've been able to do more than we would have been able to do on our own."

As he's worked with the nonprofit, he's seen benefits that include raising awareness and educating people about the river. "It helps the whole package: flood protection, environmental improvement, recreation and water quality," Gobble said. "There are no losers in the work that they're doing.

"The rest of us get caught up in the workings of government," he added. "Tar River Land Conservancy can focus on the conservation component."

THE FUTURE

TRLC has assisted with the acquisition of 179 acres that will be added to the Shocco Creek Game Land, and each week staff make new contacts and finalize current easement projects. TRLC has helped people see the Tar River as a regional resource, Gobble said. Louisburg's Joyner Park and River Bend Park encompass 90 acres along the river, and the town is pursuing another 40-acre project.

"Every spring when the dogwoods bloom, the redeyes make a run up the river," Gobble said. Some folks fish with fly rods, others sit on a bucket with a cane pole. The rock outcroppings resemble the mountains. "It feels very, very remote. It's a huge resource for wildlife and conservation in North Carolina." ◆

Kathy Norcross Watts is a freelance writer who recently published her first book, "A Simple Life: A Story of Sid Oakley." She lives with her husband and four children in Winston-Salem.

TRLC

WETLANDS ALONG THE TAR, FRANKLIN COUNTY

CANOE Camping on the CHEAP

ELEVEN Must-Have Items . . .

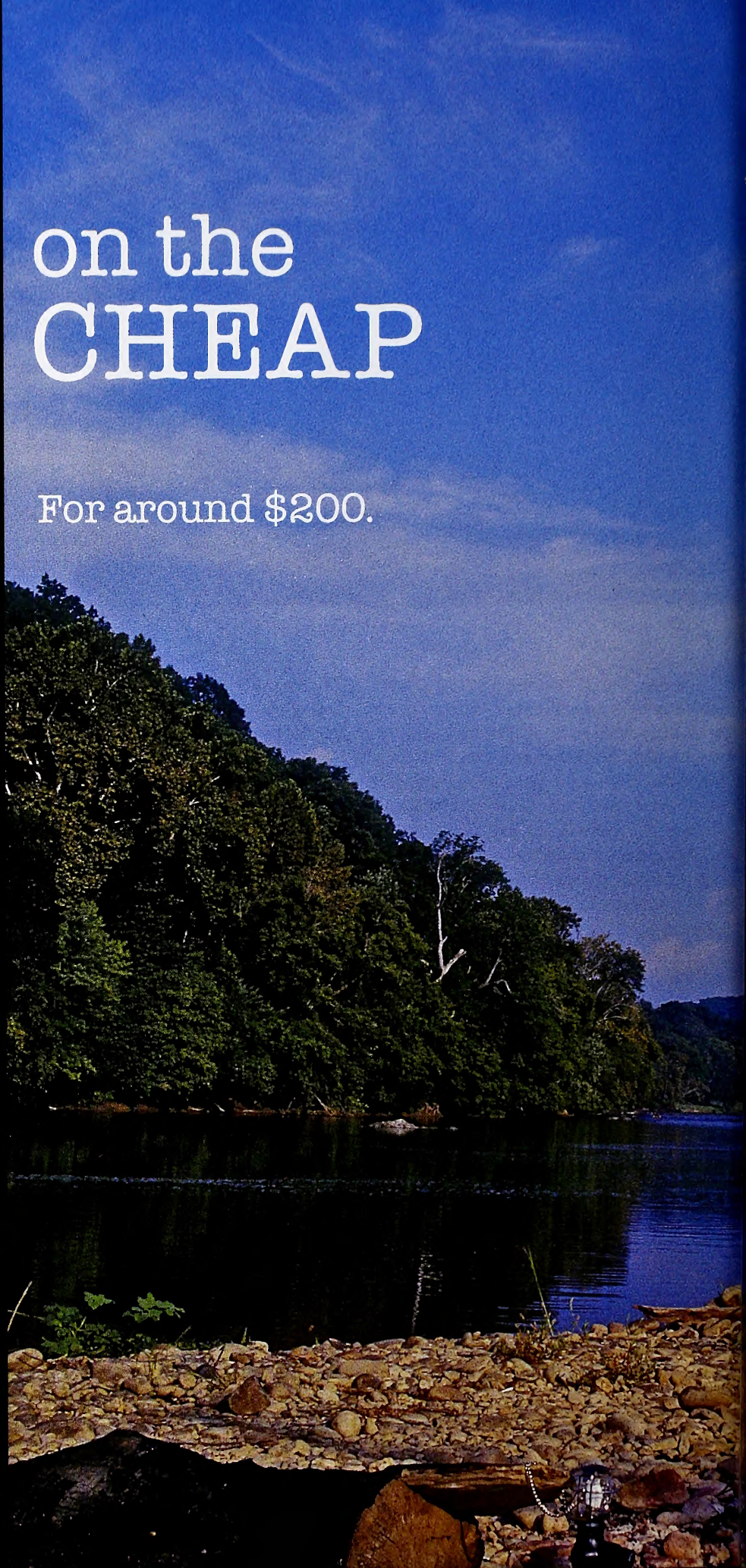
For around $200.

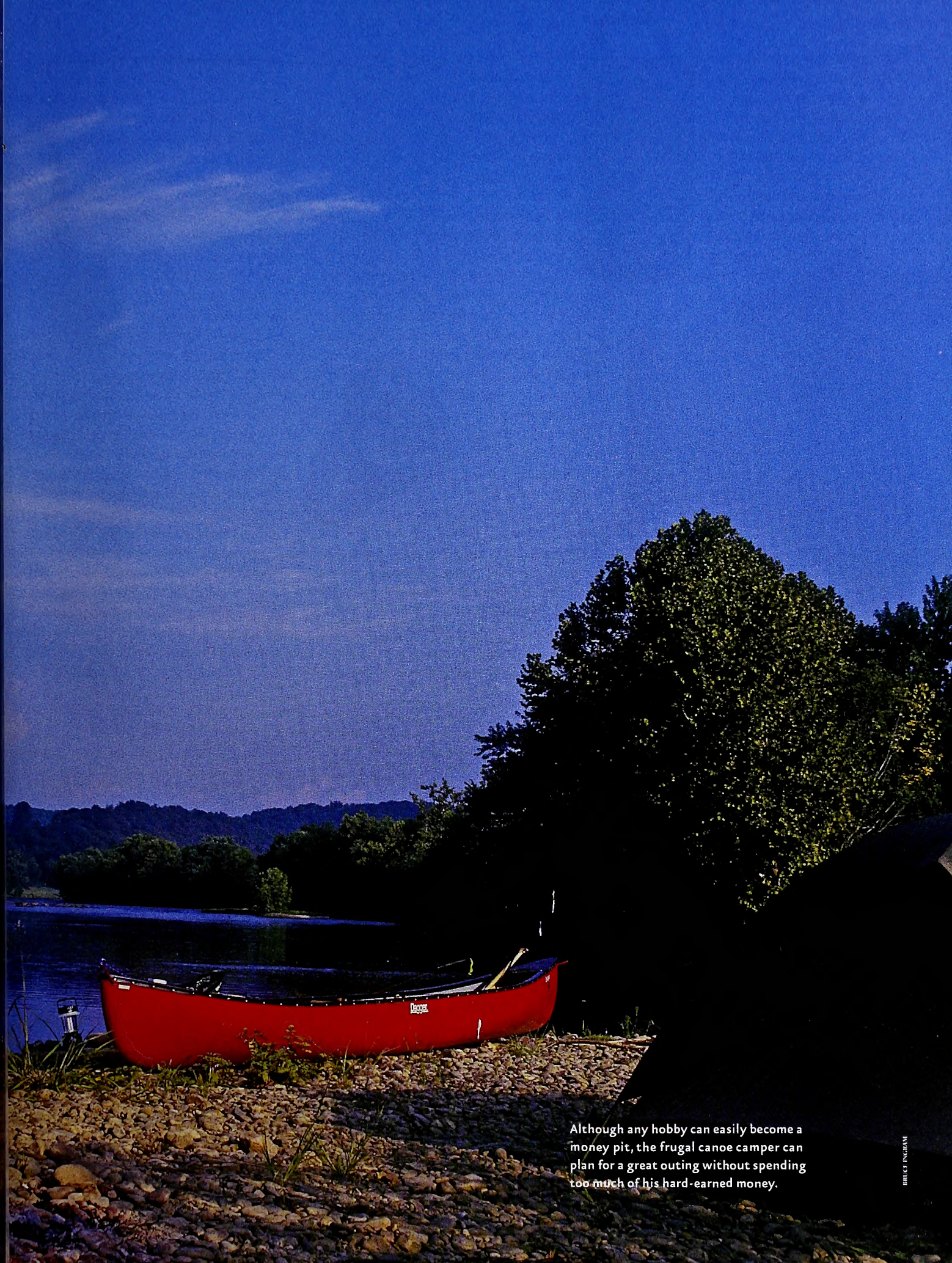
written by
Bruce Ingram

The inspiration for a canoe-camping gear story came when I received a gift certificate for a sporting goods store. Prowling the aisles of the establishment caused me to ponder just how much paraphernalia I could possibly purchase.

The point is that by spending relatively little (around $200 with some frugal shopping), canoeists who enjoy fishing, birding, exploring or outdoor photography (or all four, as I do) can turn their day trips into overnight adventures. That is, of course, if these individuals already own the bare minimum for their pursuits, such as a tent, sleeping bag and pad; for an angler, fishing gear; and for a birder, binoculars and field guides.

My good friend Craig Fields is a hardcore canoe camper who regularly undertakes weeklong or similar treks, and he offers these tidbits of gear advice. Note that most of the items below could prove useful for landlubbers who prefer to do their camping well away from the Tar Heel State's waterways.





Although any hobby can easily become a money pit, the frugal canoe camper can plan for a great outing without spending too much of his hard-earned money.

BRUCE INGRAM

Item 1: Dry Bag "You can never have too many dry bags, and if any of your river-tripping gear isn't already assigned to a dry bag, get that done first," says Fields. "The only things that I don't put into a dry bag are a cooking grate and fishing gear."

Dry bags are essential for a canoe camper but handy for the general camper as well, as they make excellent places to store food, clothes and toiletries in both situations. I also employ dry bags as scent-free storage compartments for my deer-hunting camouflage.

Item 2: Primary Light Source A Fields favorite is his Coleman double-mantle propane unit with case. For years I was too tight to spend even a few dollars for any kind of artificial light. But a night that my wife and I spent on a rapidly rising river, when we had to head for higher ground, disabused me of my excessive thriftiness. A Coleman propane unit can easily send luminosity across a camping area and cheer the disposition of everyone.

Item 3: Tent Lantern If canoe campers are desirous of more light, they can add a tent lantern. For a tent light, I bought a Coleman Floating Krypton Lantern; the buoyancy of this item is an added benefit. Another choice is Cabela's eight-LED tent light.

One of the great joys of canoe or regular camping is reclining inside a tent and replaying the events of the day with a spouse or good friend. Another sublime camping pleasure is having the time to read a good book or some other form of literature. For both situations, a tent lantern adds to the ambience.

Item 4: Headlamp A headlamp is another piece of gear that I refused to purchase for years. But headlamps are marvelous things to have when one needs to walk, for example, down to the river to fish or search for more firewood. In fact, Fields recommends purchasing two with the second one serving as a backup or for loaning.

Craig also clued me in on another attribute of these light suppliers. When bowhunters climb tree stands in the dark, they will find that a headlamp enables them to have both hands free as they ascend—an important safety consideration.

Item 5: Mini Shovel More and more campers of all persuasions are practicing the "leave no trace" ethic. An important tool in accomplishing this goal is a tri-fold entrenching tool used for digging fire pits and the burial of human waste.

For example, on an outing several years ago, while Craig was setting up the tent, he instructed me to use a mini shovel to make a fire pit. After dinner I doused the fire with water, and the next morning (after determining that the fire was completely out) we covered the pit with soil. After we paddled away from the campsite, no one could have ascertained that we had spent the night there.

Item 6: Cooking Grate One could, I suppose, make do with two rocks and a frying pan strategically placed over a fire pit, but for higher-class outdoor cooking, a heavy-duty grate receives the nod.

"A camp grate must have legs reinforced with rails at the bottom, not four spikes," insists Fields. And it should be large enough to hold lots of skewers and have no openings greater than, say, an inch.

Item 7: Cooler Fields suggests one of the newer "max" coolers that hold ice for five days. He prefers 54-quart-size ones for canoe camping. Of course, Fields often goes on weeklong excursions with his coolers. Readers who intend to go on paddling treks

Craig Fields (below, left) shoves off on an expedition. The Cabela's eight-LED tent light (second from left) offers ample illumination for a camp. A Leatherman multi-tool (third from left) is a handy addition in the field. Fields prepares venison shish kebobs (fourth from left), showing how useful a cooking grate can be (fifth from left).

BRUCE INGRAM

Consider A Multi-tool Knife

For a multi-tool knife, Craig Fields favors the traditional and famous Swiss Army Knife, specifically the Swiss Champ. He also speaks highly of tool knives made by Leatherman, but I wouldn't trade my Bucktool knife.

"If your tool knife doesn't have at least both scissors and pliers, you need a more expensive and/or larger one," emphasizes Fields.

BRUCE INGRAM

of much shorter durations can downsize accordingly.

Item 8: Rain Gear

Concerning this category, Craig is quite blunt. "New rain gear is never out of order," he asserts. "Waterproof/breathable is a must — no coated nylon."

Coated nylon, of course, is a cheap option; however, this fabric offers extremely poor protection from precipitation. Campers of all kinds can incur hypothermia at any time of the year, not just during the winter. Imagine what could happen to a human body during, for example, a spring rainstorm if the canoeists were dressed in light cotton clothing (which retains moisture) and were wearing nylon rain jackets.

Item 9: Camp Stove

I have relished consuming Fields' skewered veggie-and-venison shish kebob creations for dinner and consider them the ideal food to cook over a grate. But canoe campers and others may also find a single- or double-burner propane camp stove useful.

For example, last June I used a single burner to cook a hearty breakfast of organic oatmeal laced with bananas and dried blueberries and cranberries. Rice, soups and even pudding can cook on a propane burner, as can a host of other dishes.

Note: This item will likely be the priciest one on our 11-item gear list. Coleman, for instance, offers a dazzling variety of single and double propane camp stoves, with the most inexpensive ones beginning at around $25.

Item 10: Dining Fly

A dining fly may or may not be considered essential, but Fields believes this item adds a nice touch to an outing. He likes to extend a fly from the tent entrance out over the cooking and dining area, a particularly good thing to have done in case of rain. On one outing of ours, heavy precipitation did fall, and we would have been miserable scooting back and forth between the tent and the fire if there had not been a fly protecting the area.

Craig recommends high-quality nylon, saying it is better than polyethylene (the ubiquitous blue tarp), but notes that nylon is much more expensive.

Item 11: River Sandals and Apparel

Tennis shoes may be a popular choice, but Fields emphasizes that they are not a wise one. Rubber-based shoes have a tendency to smell, harbor germs and take a long time to dry and can lead to a variety of ailments such as athlete's foot. His suggestion: river sandals, or at least mesh-topped water shoes.

Also worthy of consideration are mesh-lined river shorts or pants. The veteran camper urges folks to consider doing away with cotton underwear and socks as well, since cotton adsorbs moisture and dries extremely slowly, "not to mention just being plain uncomfortable." The sun will dry nylon pants in 30 minutes or so. ◆

Helpful Web sites

Great Outdoor Provision Co.
www.greatoutdoorprovision.com

Bob's Red Mill
(Organic oatmeal, hot and cold cereals, soups, nuts and dried fruits)
www.bobsredmill.com

Canoe Camping USA
(Trip-planning tips)
www.canoe-camping.org

Buck Knives
www.buckknives.com

Cabela's
www.cabelas.com

Coleman Company
www.coleman.com

Leatherman
www.leatherman.com

Swiss Army Knife
www.swissarmy.com

Bruce Ingram is the author of "The James River Guide" *($15),* "The New River Guide" *($15) and* "The Shenandoah/Rappahannock Rivers Guide" *($18.25). To obtain copies, send a check to Ingram at P.O. Box 429, Fincastle, VA 24090 or contact him at be_ingram@juno.com.*

ALL PRODUCT PHOTOGRAPHY COURTESY OF CABELA'S INC.

Fields prepares to cook with a propane stove (fourth from right) like this Coleman unit (third from right). You should plan for all contingencies by packing an emergency kit (second from right). Being out on the water offers opportunities to observe wildlife (below).

BRUCE INGRAM

The Little Things

Fields suggests that campers stock up on or have replacements for what he calls the "little things." These include first-aid kit supplies, batteries, bug dope, hand sanitizers, bandannas, quick-dry camp towels, mess kit components, propane cylinders and lantern mantles.

BRUCE INGRAM

Design in Nature

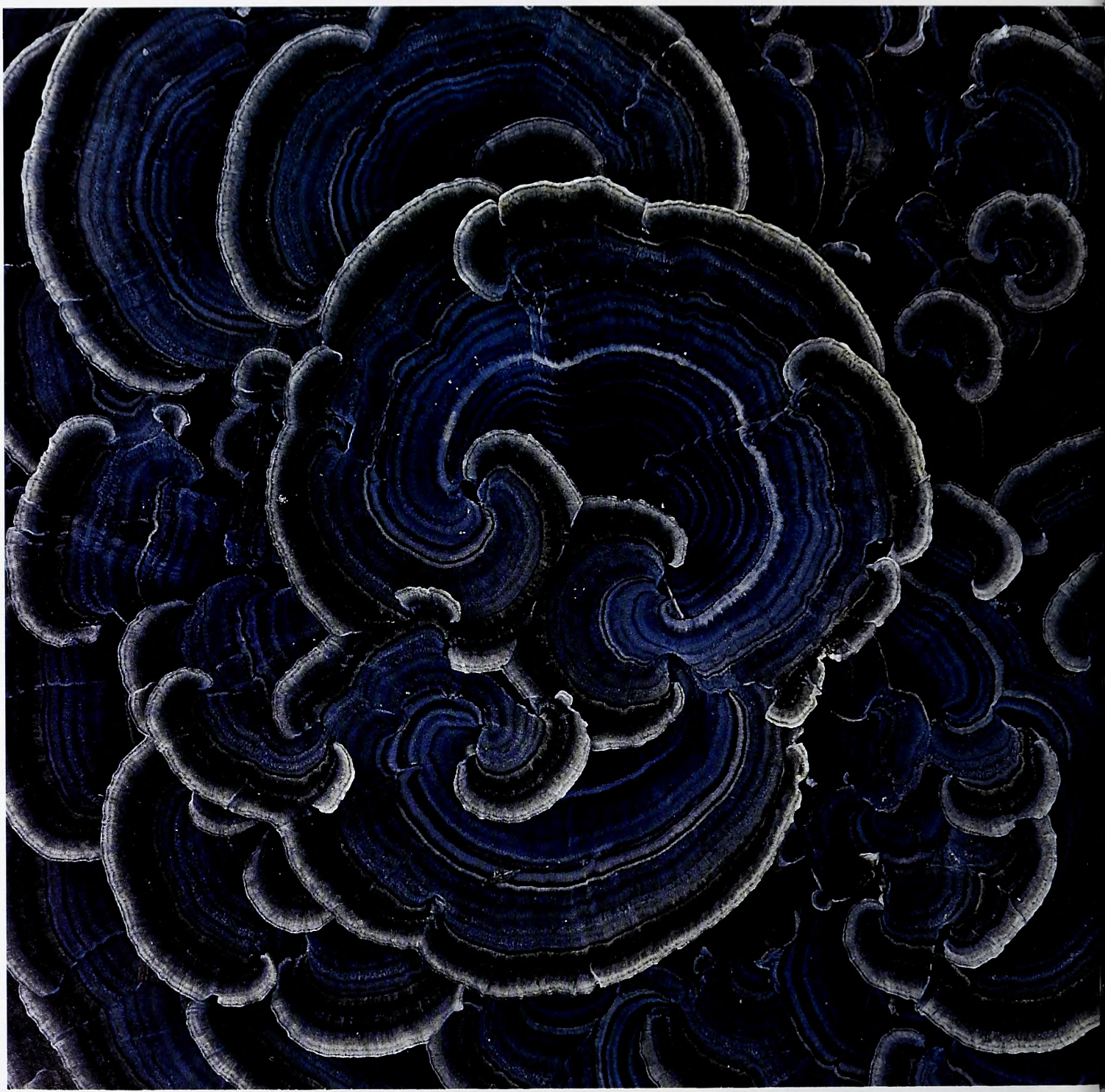
Look closely at a small item or take a broad view of a landscape, and nature's remarkable patterns often reveal themselves.

written and photographed by **Jack Dermid**

Page 20: From above, a water lily's design is order and perfection. Left: Repetition of shapes occurs in many natural designs such as the leaflets of a Christmas fern. Above: Spheres are found commonly in nature: The flowers of a button bush are arranged as a ball. Some designs tease the imagination — is this an alligator's eye or merely a knot in a bleached log? Right: A simple dendritic design in a sycamore leaf.

The skiff floated quietly on a pond covered with water lilies, the white flowers glistening in the sunlight. I leaned over the side of the skiff to look into a blossom. The perfection of the design seemed unbelievable, the petals perfectly arranged around a yellow center.

Radial symmetry is one of many designs found in the natural world. It occurs in many flowers and lower invertebrates such as sand dollars and sea anemones. Dendritic designs are found in the branches of trees and in the etchings formed by water erosion on bare land. Other designs may be patterns of many types on many surfaces. Consider the bark of trees, wind-formed ripples on a sand dune, or the scales of a fish.



Above: A stump capped with turkey-tail fungus is a design of repeated colors and shapes. Right: The whorls at the base of a longleaf pine cone extend upward around the core, facilitating seed abundance.

The practical value of some designs may be recognized easily. The alternating light- and dark-brown markings on a copperhead provide effective camouflage. I once photographed one that all but disappeared on a mosaic of lichens and moss. The whorled design of pine cones facilitates the production of the maximum number of seeds.

When I wander outdoors, I find myself looking for natural designs. I hold a leaf to the sky to discover the pattern of veins, find shapes in the drying mud or focus my binoculars on the wings of a butterfly. Try it. You will add pleasure to your adventures. ◆

Jack Dermid was managing editor and photographer for WINC *from 1950 to 1962. He is a retired biology professor and an accomplished nature photographer living in Wilmington.*

Gem of the Piedmont

Little-known Roanoke bass, restricted to a handful of small rivers, are the most overlooked of North Carolina game fish.

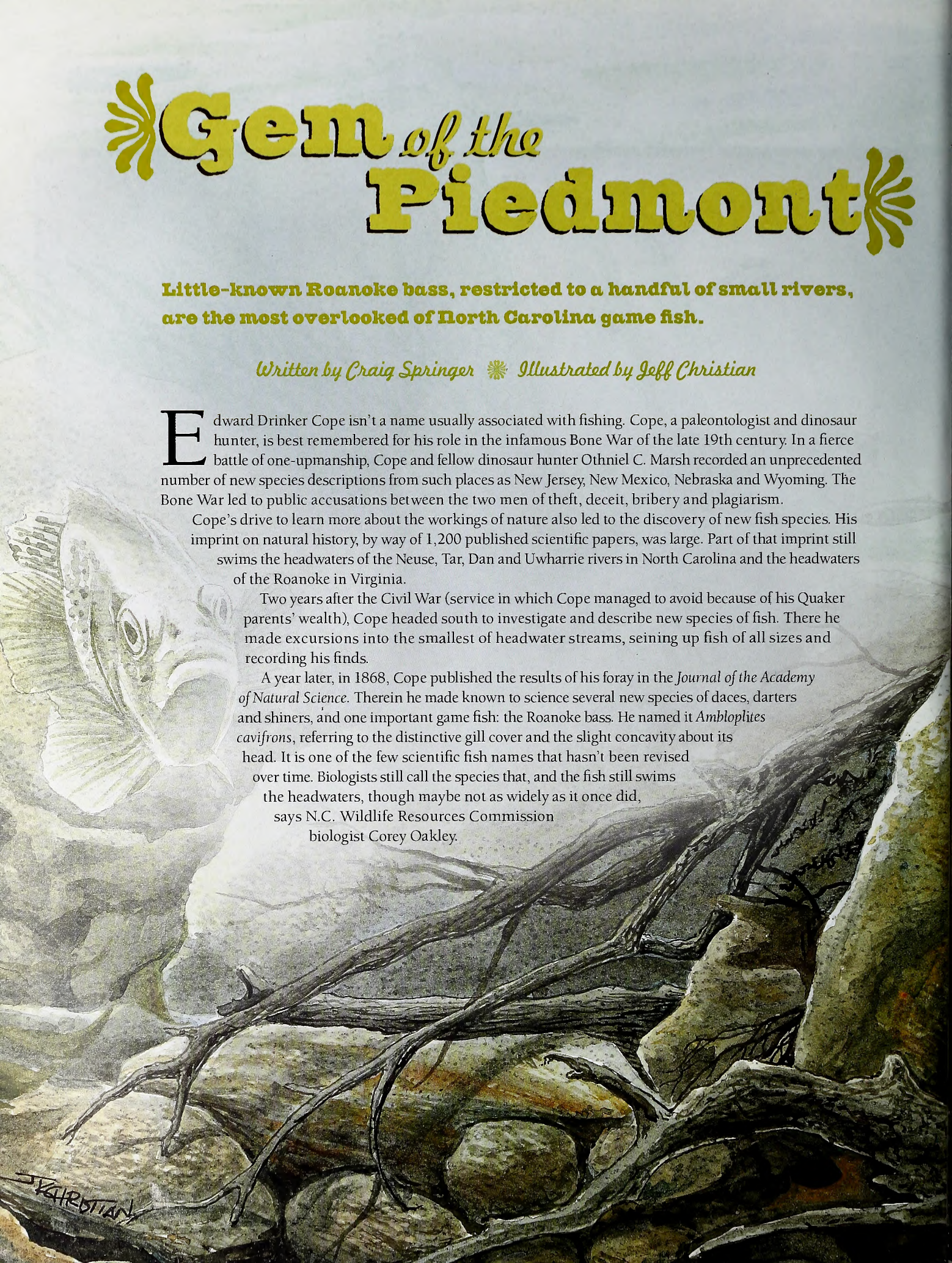
Written by Craig Springer ✻ *Illustrated by Jeff Christian*

Edward Drinker Cope isn't a name usually associated with fishing. Cope, a paleontologist and dinosaur hunter, is best remembered for his role in the infamous Bone War of the late 19th century. In a fierce battle of one-upmanship, Cope and fellow dinosaur hunter Othniel C. Marsh recorded an unprecedented number of new species descriptions from such places as New Jersey, New Mexico, Nebraska and Wyoming. The Bone War led to public accusations between the two men of theft, deceit, bribery and plagiarism.

Cope's drive to learn more about the workings of nature also led to the discovery of new fish species. His imprint on natural history, by way of 1,200 published scientific papers, was large. Part of that imprint still swims the headwaters of the Neuse, Tar, Dan and Uwharrie rivers in North Carolina and the headwaters of the Roanoke in Virginia.

Two years after the Civil War (service in which Cope managed to avoid because of his Quaker parents' wealth), Cope headed south to investigate and describe new species of fish. There he made excursions into the smallest of headwater streams, seining up fish of all sizes and recording his finds.

A year later, in 1868, Cope published the results of his foray in the *Journal of the Academy of Natural Science*. Therein he made known to science several new species of daces, darters and shiners, and one important game fish: the Roanoke bass. He named it *Ambloplites cavifrons*, referring to the distinctive gill cover and the slight concavity about its head. It is one of the few scientific fish names that hasn't been revised over time. Biologists still call the species that, and the fish still swims the headwaters, though maybe not as widely as it once did, says N.C. Wildlife Resources Commission biologist Corey Oakley.



Want to learn more about stream fishing?

Oakley and McRae have co-authored a booklet, "Piedmont Streams Fishing Guide of North Carolina," that provides information on a number of these places, including access points and species that inhabit the waters. The publication is available at the commission's Web site, www.ncwildlife.org.

Oakley and fellow biologist Brian McRae are seeking to learn more about one of the rarest game fishes in North Carolina, and indeed the entire country. The Roanoke bass has one of the smallest natural ranges of any fish, game or nongame. It is classified as "significantly rare" by the N.C. Natural Heritage Program because of that limited range. Oakley and McRae are engaged in a five-year study of the Roanoke bass that will continue until 2008. They want to learn what's out there in terms of population sizes, how those populations are faring and what needs to be done to protect the fish. Depending upon what Oakley and McRae find, the commission might promote the Roanoke bass as a game fish species and the North Carolina gem that it is.

The search for facts

But first things first, says Oakley. He and McRae want to determine whether Roanoke bass are rare because of their restricted range or if population levels are depressed. The biologists will conduct mark-and-recapture studies to determine current population levels in the Eno River. To accomplish that, each fish they collect will get a unique numbered tag, allowing the researchers to quantify population size, identify specific growth rates and determine fish movement.

"If this part of the study on the Eno goes well, we will probably carry it to other rivers such as the Tar, Flat and Little rivers," says Oakley. "We'd get a better understanding of what Roanoke bass are doing throughout North Carolina."

Oakley and McRae also will look at the fish's habitat needs, perhaps coming to understand better what the fish need in terms of pools, riffles, rocks and vegetation. Oakley expects to do an in-depth habitat analysis. "We would really like to be able to classify what habitats are most important for both juvenile and adult Roanoke bass," Oakley says. "That way, as we go further and carry it to other river systems, we will be able to better identify productive Roanoke bass habitat."

Because the fish is not widely found, it has gone understudied, despite being known for about 140 years. Biologists have a cursory understanding of what the fish needs for habitat. Oakley says that from experience he recognizes that habitat when he sees it. In general, the fish prefer the big creeks and small rivers in the Neuse and Tar basins. The fish do not fare well in flat water. It is fast-flowing water, with what Oakley calls "boulder gardens," that the fish seem to favor. Never mind the bowling-ball-size rocks; Roanoke bass like them bigger. Boulder-strewn pools are the favored haunts. In the throat of a deep pool and in deep, fast-flowing runs are where the fish tend to occur in these streams.

As the rivers get bigger and flatter, they become more silty-bottomed, something Roanoke bass seem to shy away from. The fish also are intolerant of lakes, which have little or no current and can be laden with silt. Though not usually thought of as a form of pollution, silt deposition from various sources, such as timbering and agriculture, can choke stream bottoms. Silt covers the rocky lairs of the Roanoke bass' favorite food, crayfish, and might prevent aquatic insects from breeding. Too much silt could also impair the spawning of Roanoke bass themselves, as they build and guard nests over a gravely bottom. Silt that covers fish eggs could hinder oxygen-rich water from percolating through the eggs, and the eggs could suffocate.

Close cousins

The Roanoke bass is one of four similar species in the genus *Ambloplites*. Two of its kin are widely separated by hundreds of miles. The Ozark bass swim the small streams of southern Missouri and northern Arkansas. Shadow bass occur mostly in Alabama and Mississippi. Rock bass, the closest relatives of the Roanoke bass, are the most widely distributed of the four. Rock bass are native to much of the Mississippi and Ohio River basins, and indeed over much of the Midwest and southern Canada. Biologists and anglers alike have mistaken Roanoke bass for rock bass because of their similar appearance. Roanoke bass have even been considered a subspecies of the rock bass, but that classification is not supported by genetics research. The Roanoke bass is to rock bass what a smallmouth bass is to its largemouth cousin — similar, but not the same species.

Its relatedness to the rock bass can also be a burden to the Roanoke bass' well-being. The two are so closely related that they can interbreed and hybridize. The two fishes do not naturally coexist in the same waters, but the rock bass was introduced into the headwaters of the Roanoke in Virginia. In an odd twist, the Roanoke bass has become relegated to a historic species in part of its namesake waters. So far, there is no known hybridization with rock bass in North Carolina, although Duke Energy monitoring surveys have found both species together in the Dan River near Eden.

The Roanoke bass is distinctive in appearance. It's mostly olive to olive brown on top and a brassy olive on the sides, with golden green and iridescent white spots. On the bottom, it's white or a pale lime green. Its eye is invariably neon red, hence the common names redeye bass, red-eyed perch or goggle-eye.

Compared to its three close kin, the Roanoke bass grows bigger and faster. The fish become sexually mature at about 3 years of age and are about 8 inches

in length. They are known to live up to 9 years in the wild and reach a maximum size of about 4½ pounds. North Carolina's state record Roanoke bass, landed in 1994 from Fishing Creek in Nash County, weighed 2 pounds, 11 ounces.

Young Roanoke bass eat primarily small bugs and crustaceans. As they grow, their diet shifts toward small fish, insects and especially crayfish. A growth-and-diet study of Roanoke bass in the Eno and Tar rivers by commission biologists Frank McBride, Roger Jones and Fred Harris in 1980 showed that the fish have a tendency to forage in fast-flowing water, based on the occurrence of certain weeds in the fish's stomachs. The nocturnal nature of the Roanoke bass's favored fare—crayfish—might partially explain why the fish have such relatively large eyes: to let in more light to better see prey moving about in the crepuscular light of dusk and dawn.

Armed with that knowledge, an angler should have a good idea of the best way to wrangle these fish from their rocky pools. Crayfish and minnow imitations seem the logical choice. Small, shallow-running crankbaits on a light spinning rig should work well, as would spinners, grubtail jigs and spoons. Or if you want to fly-fish, a Clouser or marabou minnow, woolly bugger or any crayfish imitation ought to produce fish. Dunking worms and live minnows is a traditional, reliable method.

Oakley says that Roanoke bass creeks are often overlooked and underfished. "Stream fishing in the Piedmont is not a focus for most anglers, and if we can publicize the availability and the ease of access to Roanoke bass, maybe we can turn that trend around. The neat little fact about Roanoke bass is that they occur in rivers that flow through the heart of the Triangle area—Raleigh, Durham, Chapel Hill—so the opportunity is there for many people to fish these beautiful Piedmont streams."

Just how much angling pressure Roanoke bass can sustain is unknown, and determining that is one of the purposes behind Oakley and McRae's research. Currently there are neither creel nor size limits for Roanoke bass in North Carolina. "Until our research is complete," McRae says, "it would be a good idea for anglers to be conservative in their harvest of these fish." ◆

Craig Springer is a freelance writer living in New Mexico. This is his first story for WINC.

NATURE'S WAYS

How do Roanoke bass swim in strong currents?

See Nature's Ways, page 39.

WILDLIFE IN NORTH CAROLINA 2007 PHOTO COMPETITION

STEVEN KAUFMAN

One need not find rare species to capture a beautiful nature photo. Good composition and lighting make this picture of a common buckeye butterfly on a black-eyed Susan a fine photograph indeed.

Beautiful images of the natural wonders of North Carolina have inspired generations of people to be better stewards of our precious natural resources. The *Wildlife in North Carolina* Photo Competition aims to encourage people to participate in wildlife photography, thereby fostering greater appreciation of North Carolina's wildlife and natural resources.

Excellent wildlife photography has been the cornerstone of *Wildlife in North Carolina* magazine and of exhibits at the N.C. Museum of Natural Sciences in Raleigh for many decades. Winning photographs will be published in the January 2008 issue of *Wildlife in North Carolina* and will be exhibited at the Museum of Natural Sciences and at other science museums and wildlife centers across the state in 2008.

WHO MAY ENTER

Amateur and professional photographers, except for N.C. Wildlife Resources Commission and N.C. Museum of Natural Sciences employees and their immediate families (children, siblings and spouses).

WHAT TO ENTER

Photos will be judged in 10 categories:

Birds

Mammals

Reptiles and Amphibians

Invertebrates

Peaks, Valleys and Plains: Our landscape category.

Wild Plants: Wild-growing plants only, including their flowers, leaves, fruits and other parts. Absolutely no cultivated plants will be accepted.

Outdoor Recreation: Show how people interact with North Carolina's natural world, from hunting and hiking to fly-fishing and free climbing to canoeing and shell-collecting. Please confine entries to activities that are inextricably linked to nature. Events such as beach weddings and team sports, although held outside, are not in keeping with the spirit of this category and are not eligible.

Animal Behavior: Anything animals do, from everyday activities to interactions with other animals to unusual behavior.

Youth Photographer, 13–17: Any of the above subjects, shot by photographers under 18.
Youth Photographer, 12 and under: Any of the above subjects, shot by children 12 and younger.

- Photographs must have been taken in North Carolina within the last five years—no earlier than Sept. 14, 2002.

- You must declare on your entry form if your photograph is of an animal in captivity, such as at a zoo, nature center or rehabilitation facility. Please do not enter photos of animals that are both captive and non-native to North Carolina (for example, polar bears or lions at the N.C. Zoo). No pets or domestic animals will be accepted, with the exception of animals participating with people in outdoor recreation (for example, hunting dogs or riders on horseback). Please do not harass wildlife in an attempt to photograph it.

- Manipulation of images, either film or digital, should be limited to conventional darkroom techniques or basic sharpening and cropping. Images should contain only the subject matter as originally seen through the viewfinder. Double exposures, digitally stitched photos and images containing any manipulated or added content should not be entered and will not be accepted.

- An entrant must hold all rights to a photograph. Photos previously published or pending publication, or that violate or infringe upon another person's copyright, are not eligible. Please do not infringe on the rights of property owners in an attempt to photograph animals.

HOW TO ENTER

Visit www.ncwildlife.org, click on the Photo Competition link and then click on the Enter a Photo link to submit a photograph. Only JPG files smaller than 2MB will be accepted. Upload your photo using the online entry form on the Web site. Repeat this process for each photo entered. Entrants may submit a maximum of three (3) photos per category.

Competition begins at 8 a.m. on June 1, 2007. Entries must be uploaded by 5 p.m. on Friday, Sept. 14, 2007. Entrants may verify receipt of entries by checking www.ncwildlife.org and clicking on the Photo Competition link to view a text list of all entries.

Entrants in the youth categories must be the appropriate age for the category entered on the closing date of the competition.

PRIZES

All winners will be published in the January 2008 issue of *Wildlife in North Carolina* magazine and exhibited at the N.C. Museum of Natural Sciences in Raleigh. Winners will also receive a print of their winning entry.

- **Grand prize:** Your photo published on the cover of the January 2008 issue of *Wildlife in North Carolina* magazine, plus $200.
- First place, all categories: $100.
- Second place, all categories: $75.
- Third place, all categories: $50.

JUDGES

Winners will be selected by a panel comprised of staff of the N.C. Wildlife Resources Commission, N.C. Museum of Natural Sciences, *The News and Observer* of Raleigh, UNC-CH School of Journalism and professional wildlife photographers.

THE FINE PRINT

By entering the 2007 *Wildlife in North Carolina* Photo Competition, entrants grant *Wildlife in North Carolina* magazine the right to publish and use submitted photographs in print or electronic form to promote the competition. Reproduction of entries will include photographer credit.

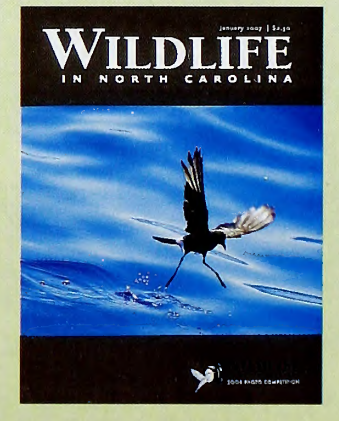
Entrants agree that if their submission is selected as a winner, they grant the N.C. Museum of Natural Sciences the right to display their photograph(s) at the museum's Raleigh location and at other venues in North Carolina. Exhibition of entries will include photographer credit. Winners also grant the Museum the right to publish photos in its magazine, *North Carolina Naturalist*.

Winners will be required to provide original source material—slides, high resolution digital files or negatives—for reproduction in the magazine and for exhibition prints. Original digital files of winning photos must be accompanied by a color print of at least 4x6 inches.

Wildlife in North Carolina staff will determine entry eligibility.

Please do not call about the status of entries. Send questions to competition@ncwildlife.org.

Enter online at www.ncwildlife.org.



Your photo could be next January's cover.

Ground-Nesting Birds

written by Susan Carl / illustrated by Helen Correll / nature activity by Anne M. Runyon

KILLDEER CHICK

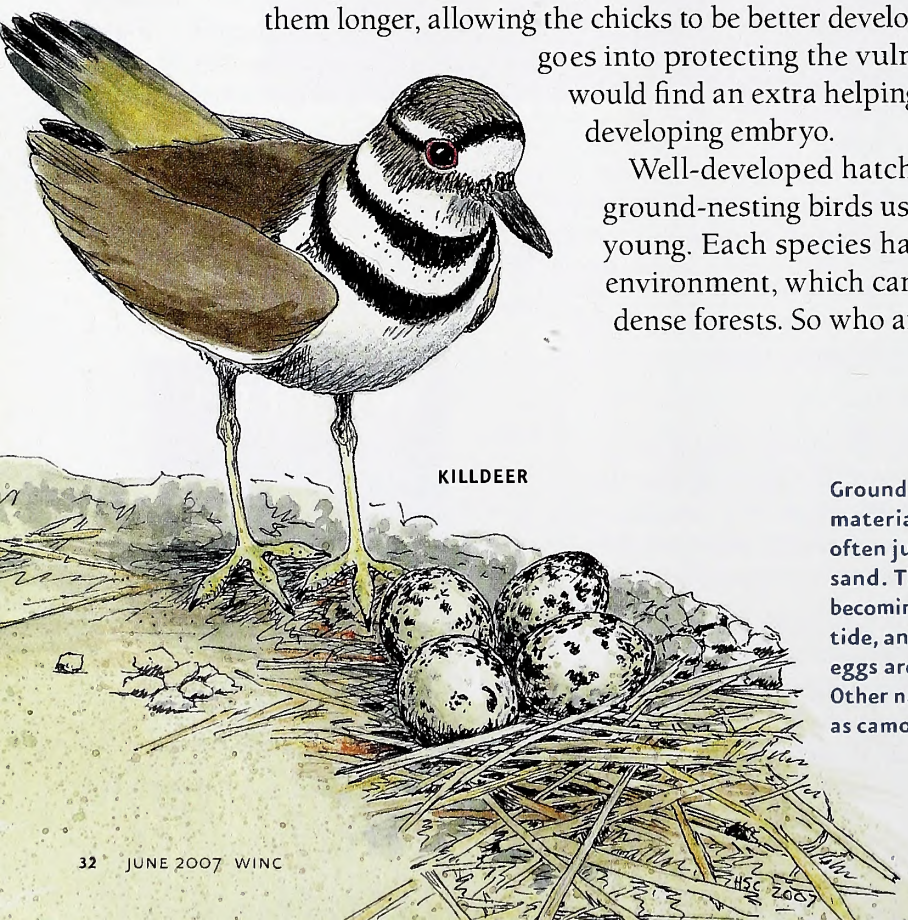
Think of a bird's nest, and you probably picture a woven bowl-shaped structure tucked among the branches of a tree. But not all birds nest in trees or shrubs. Some choose to nest right on the ground, where hungry predators can easily reach eggs or hatchlings. Fortunately these birds have a variety of tricks to protect their young from becoming a quick snack.

FAST LEARNERS

Most ground-nesting birds are what ornithologists call precocial. That's like someone calling you precocious—in both cases it means fast to mature. These newborn birds hit the ground running, quite literally. Although they can't fly when first hatched, the chicks' well-developed legs allow them to leave the nest and flee predators on foot. Precocial birds also hatch with their eyes open and are covered in warm, fluffy down.

The role of adult birds is also different in ground-nesting species. Rather than constantly feeding their young in the nest, the parents teach them to forage on their own right from the start. The adults also spend far less time brooding the hatched chicks to keep them warm. Poor parenting? Not really, because these birds invest their energy in the eggs. They incubate them longer, allowing the chicks to be better developed when hatched. A lot of effort also goes into protecting the vulnerable eggs from predators, which would find an extra helping of nutritious yolk meant for the developing embryo.

Well-developed hatchlings are just one strategy that ground-nesting birds use to ensure the survival of their young. Each species has adaptations to fit its specific environment, which can vary from the seashore to dense forests. So who are these ground nesters?



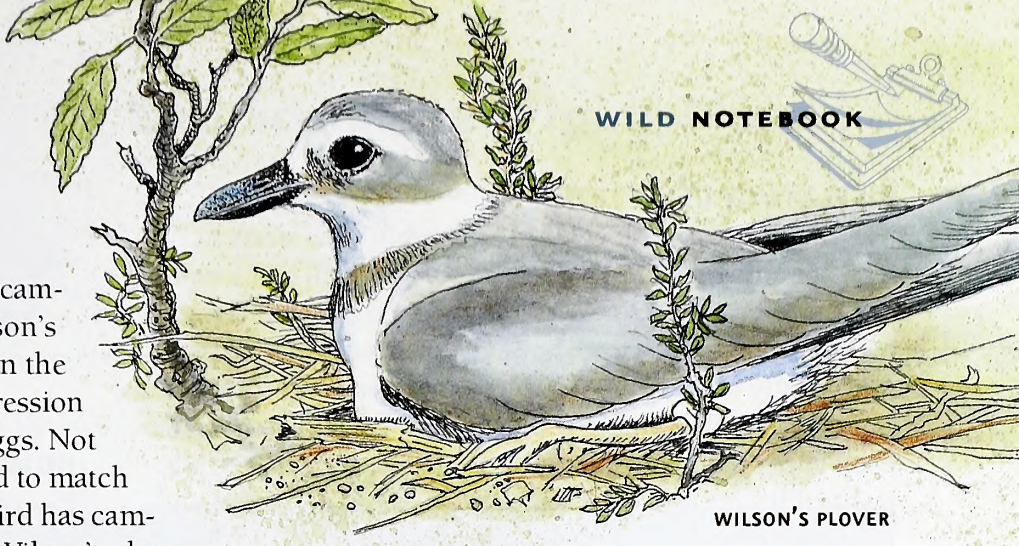
KILLDEER

Ground nests are typically fairly simple. If any material is gathered to create the nest, it's often just enough to raise eggs off the soil or sand. This buffer prevents the eggs from becoming embedded after a rainfall or high tide, and guards against cracking when eggs are rotated during incubation. Other natural materials may be added as camouflage for the exposed eggs.

BLENDING IN

The tried-and-true technique of camouflage is well used by the Wilson's plover. These birds nest right on the beach, scraping out a small depression in the sand or gravel for their eggs. Not only are the blotchy eggs colored to match the background, but the adult bird has camouflaging plumage as well. The Wilson's plover and its eggs blend in so well that they become almost invisible on the beach.

Once the eggs hatch, most shorebirds like the Wilson's plover quickly remove broken shells from the nest site. The bright white interior of the egg would foil the careful camouflage that the birds have created, alerting crows and other sharp-eyed predators.



WILSON'S PLOVER

Like most shorebirds, the Wilson's plover is countershaded, with dark feathers on the back fading away to a pure white belly. Countershading helps eliminate a sharply defined shadow on the bird's body.

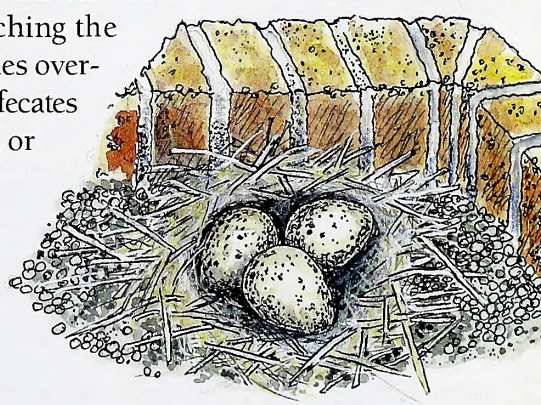
SAFETY IN NUMBERS: A WORLD OF TERNS

The least tern is another shorebird that nests on the beach in a simple depression in the sand. But unlike the Wilson's plover, it would be hard to miss the terns' nest sites. These birds have a striking black cap and make themselves even more conspicuous by nesting together in colonies, often with other tern species.

How does this help the young survive? What happens when a predator such as a laughing gull flies near a colony of nesting birds? A mob of angry parents rises up and chases the intruder away. Least terns even have a defense against animals approaching the colony on foot. A bird flies overhead, then hovers and defecates on the hapless raccoon or feral cat.

LEAST TERNS

HERRING GULL EGGS

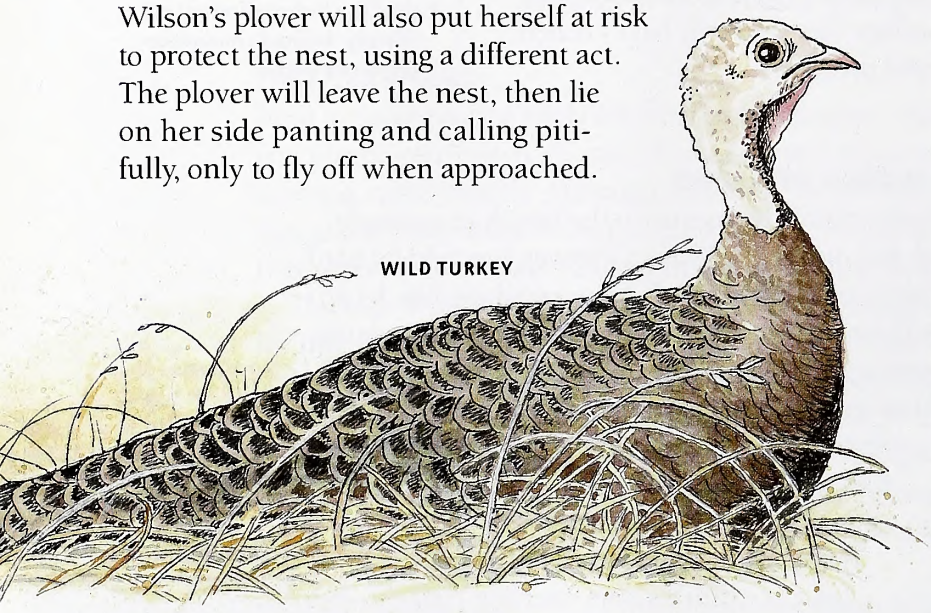


With human activity increasing in their territories, some ground-nesting birds have adapted by using manmade structures for nest sites. In particular, flat, gravel-topped roofs have become an alternative nesting area for killdeer, least terns, herring gulls and common nighthawks.

DISPLAYS OF DECEPTION

The chuck-will's-widow is a secretive bird that nests in pine or hardwood forests. The bird sits very still on its well-camouflaged ground nest, and most predators walk right by. If one comes too close, however, the bird acts as a decoy and quietly moves away from the nest. At a safe distance from the eggs or young, the parent bird will suddenly make itself conspicuous by dragging a wing along the ground, just as if it were broken. The predator sees an easy meal and follows the bird. But before it can be caught, the chuck-will's-widow rises into the air, having successfully lured the predator away from the nest site.

Ground-nesting birds are well known for these realistic distraction displays. Back on the beach, the female Wilson's plover will also put herself at risk to protect the nest, using a different act. The plover will leave the nest, then lie on her side panting and calling pitifully, only to fly off when approached.



WILD TURKEY

MALLARD

HOME ON THE GROUND

Plovers, terns and nightjars like the chuck-will's-widow are only a few of the ground-nesting birds found in North Carolina. Many other familiar species raise precocial young in nests on the ground, including gulls, quail, geese, wild turkeys and mallards. Although their simple nests are more vulnerable to predation by mammals, the chicks learn quickly to fend for themselves. Whether it's a scraping at the seashore or a grass-lined hollow on the forest floor, it's still a nest.

Not all ground-nesting birds are precocial. The Eastern towhee and grasshopper sparrow build grass nests on the ground, but their young are blind and relatively helpless upon hatching, like most other perching birds. This pattern of development is termed altricial. The belted kingfisher and the Northern rough-winged swallow are also altricial, but they dig burrows into the ground where they lay their eggs. The burrows of the belted kingfisher can be 6 feet deep!

Get Outside

If you or your neighbors raise domestic fowl such as chickens, turkeys, or quail, you have an excellent opportunity to observe precocial ground-nesting birds firsthand. Look at the color of the eggs—are there camouflaging markings? What about the size of the eggs? Typically they are larger than those of similar-sized tree-nesting birds. This is because the chicks are more fully developed when hatched. Notice the characteristics of these chicks that distinguish them from those born in tree-top nests. Do parent birds bring food to the chicks, or show them how to feed themselves? If no domestic fowl are in your area, visit a museum to compare egg size and color among different bird species.

When exploring natural areas in the spring and summer, be aware of ground-nesting birds and stay clear of any nests you may come across. It is not uncommon to observe the broken-wing or other distraction display if you accidentally venture too near a nest site. The display should serve as a warning that a nest or young are nearby and to proceed cautiously.

Read and Find Out

- "Secret Lives of Common Birds: Enjoying Bird Behavior Through the Seasons" by Marie Read, Houghton Mifflin Company, 2005.
- "Birds of the Carolinas" by Eloise F. Potter, James F. Parnell, Robert P. Teulings and Ricky Davis, University of North Carolina Press, 2006.
- "The Birder's Handbook: A Field Guild to the Natural History of North American Birds" by Paul R. Ehrlich, David S. Dobkin and Darryl Wheye, Fireside, 1988.
- "The Life of Birds" by David Attenborough, Princeton University Press, 1998.

In *Wildlife in North Carolina:*

- "The Shorebird No One Sees" by Walker Golder and James F. Parnell, March 1987.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Make a Ground-Nesting Bird Sculpture (Piping Plover)

1) Cut out box. Cut out four eggs and set aside.
2) Fold plover in half, folding down along the ··· line.
3) Cut plover out along the thick black lines, and then unfold.
4) Fold neck up along the --- line.
5) Fold head down along the ··· lines, matching together the dark neckband.
6) Curl and glue the abdomen together, right side on top, matching the curved line.
7) Glue beak shut.
8) Fold legs down along the ··· lines.
9) Turn plover upside down. Glue eggs together under plover, matching the curved line.
10) Turn plover right side up and glue the four eggs in place between the legs.

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

back porch

NEWS and NOTES

Edited by Jim Wilson

New "Bear Facts" is Designed for Educators

Over the course of just a few months, the N.C. Wildlife Resources Commission's new DVD edition of "The Bear Facts: The Story of a North Carolina Treasure" has proven to be a hit with educators.

The original 36-minute made-for-TV documentary about North Carolina's black bear population is being offered in an Educator's Interactive Edition DVD that provides eight additional interactive functions for students to enjoy. The DVD is accompanied by a CD containing lesson plans, bear-related activities, maps and more educational materials suitable for grades K-12.

The project was the creation of Mark Jones, the commission's black bear biologist. The original short film has become a popular mainstay on many area public television stations. Now, educators across the Tar Heel state can request this unique learning tool at no cost through the N.C. Wild Store at www.ncwildlife.org.

"We've got a generation of kids growing up who don't really know about wildlife management in the state unless they know someone who hunts or teaches about the subject," said Jones. "I saw a great opportunity to teach a lot of the kids out there and dispel a lot of the myths about bears."

Over the course of several months, the commission has distributed more than 2,000 copies of the DVD. That response confirms what Tanya Poole, the commission's regional education specialist for the Piedmont, saw when she first began introducing "The Bear Facts" to educators. Poole brought in 15 teachers to test the DVD, and then began showing it at workshops.

"Teachers have been ecstatic about it," Poole said. "They've been very excited. Teachers can pick and choose among the education segments, which are five or six minutes long. I think the reason it works so well is that Mark spent a lot of time making sure the information could be used in many different areas.

"A lot of times, products like this are not North Carolina specific. You might find a video in the school on lions or tigers, but nothing specifically about North Carolina."

Jones designed the project so that teachers could expand beyond black bears, which are found in North Carolina's western mountains and coastal areas. "It teaches about broader issues like wildlife management and habitat," Jones said. "It's not just bears."

Jones said the free resource can be easily applied to subjects like geography, history and math, in addition to the sciences. Jones also has been adamant that all kinds of educators have free access. In addition to public and private school teachers, the package is available to church groups, wildlife clubs, Boy and Girl Scout troops, museums and state parks, and other educational groups.

The offering is available through a funding grant provided by the commission and a private foundation, and was screened and approved by a panel of 80 educators from across the state.

Pusser Photos on Display at Museum

The photographs of frequent *WINC* contributor Todd Pusser will be featured at the Nature Art Gallery at the N.C. Museum of Natural Sciences in Raleigh from June 1 to July 29. The show's theme is ocean life and will include images from around the world. From Antarctica to the Bahamas, New Zealand to Russia, Pusser has captured award-winning photographs of spectacular marine life such as sharks, penguins, manatees and dolphins. His pictures are featured in magazines, books and calendars worldwide, but this will be the first showing of his marine photography in a gallery.

Also featured in the show will be fellow North Carolina photographer Charles Rawlings, a specialist in underwater photography. The Nature Art Gallery is located in the upper level of the museum gift shop. Admission is free. Gallery hours are 9 a.m. to 5 p.m. Monday through Saturday, noon to 5 p.m. Sunday, and until 9 p.m. on the first Friday of each month. For further information, please contact curator Karen Bethune at (919) 733-7450, ext. 369, or karen.bethune@gmail.com.

N.C. Duck Stamp Competition Goes National

For the first time since its creation in 1983, the painting used for North Carolina's Waterfowl Conservation Stamp will be chosen through an art competition open to the public nationwide. The N.C. Wildlife Resources Commission, in conjunction with The East Carolina Wildfowl Guild, will accept entries until January 2008.

The program, which has commissioned an artist in previous years, will select a winner to appear on a postage stamp and collectible print that will be made available statewide. Proceeds from these sales go to the Commission's waterfowl fund, which has raised more than $4.2 million since its inception.

A pair of green-winged teal was the subject of the 2005 North Carolina Conservation Stamp.

Entries must be full-color, realistic renderings of one of the following scenes:

- Tundra swans in winter wheat
- Snow geese in corn stubble
- Canada geese in Piedmont pasture
- Brant in open water/shoal habitat
- Surf scoters flying low along the crest of ocean waves

Artists are limited to one submission each. Paintings must be horizontal and measure 13 inches by 18 inches, matted in white, and bear no signature or other marks that would identify the artist.

Mailed entries must be received by Jan. 14, 2008, at 5 p.m., while hand-delivered paintings carry a Jan. 27, 5 p.m., deadline. All submissions must be accompanied by a signed artist agreement form and a $50 entry fee, and be in full compliance with the guidelines set forth by the official entry form, which is available at www.eastcarolinawildfowlguild.com.

Selected works will be shown at the Preview Reception of the East Carolina Wildlife Arts Festival and North Carolina Decoy Carving Championships. Five finalists will be announced at the Preview Reception on Feb. 8, and will remain on public display throughout the festival. That weekend, the commission will announce the winner, who will receive $7,000.

Winter Turkey Harvest Lowest on Record

North Carolina experienced its lowest winter wild turkey harvest this year in the four-year history of the season. But upland game bird biologist David Sawyer said it's difficult to draw many conclusions from the fact that hunters killed just 130 birds in January, a drop of 44 from the 2006 season.

"Without knowing what the hunter effort was—how many hunters we had and how many days they hunted—you really can't draw many conclusions from the harvest," Sawyer said.

In a nutshell, hunters killed 51 adult males, 20 jakes and 59 hens during the either-sex season that is restricted to 10 counties. The spring season is limited to bearded turkeys only. Not surprisingly, the opening and closing days of the six-day season saw the most action, with 33 birds killed on each of those days.

Wilkes County had the largest harvest, with 21 birds killed, followed by Ashe with 19 and Watauga with 18.

In the brief existence of the winter season, the harvest totals have seesawed. After 181 birds were killed in the initial season in 2004, 151 were killed the next season, followed by 174 in 2006 and then this year's 130.

NORTH CAROLINA'S 2006 TURKEY HARVEST

COUNTY	TOTAL	ADULT MALES	JAKES	HENS
WILKES	21	8	2	11
ASHE	19	8	4	7
WATAUGA	18	4	5	9
ALLEGHANY	17	5	3	9
ROCKINGHAM	16	7	1	8
GRANVILLE	14	7	2	5
STOKES	8	5	0	3
PERSON	7	1	2	4
CASWELL	6	3	1	2
SURRY	4	3	0	1

ON PATROL

While Senior Officer Steve Barnett was checking bank fishing along Northwest Creek, he noticed one man trying to bite his line in two as soon as he saw Barnett. After biting his line, the subject began walking toward the officer.

The man told Barnett that he did not need a license because he was fishing with natural bait. (This was prior to the repeal of the natural bait exemption on Jan. 1.) But after Barnett pointed out the artificial lure stuck to the man's shoe and the fishing line wrapped around his foot, the subject admitted he had been previously advised he needed a fishing license. The man was charged with fishing without a license.

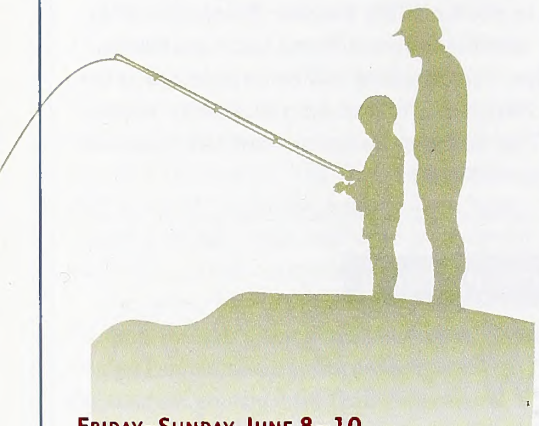
ILLUSTRATED BY JACKIE PITTMAN

CALENDAR OF EVENTS

SATURDAY, JUNE 2

Join in the festivities at "Take A Kid Fishing Day" at the John E. Pechmann Fishing Education Center in Fayetteville. Event runs from 9 a.m. to 1 p.m. Contact (910) 868-5003 or visit www.ncwildlife.org for other fishing opportunities for children.

Kick off National Fishing and Boating Week by taking a child fishing from 9 a.m. to noon at the Youth Fishing Rodeo at Strayhorn Pond near Chapel Hill. Call (919) 245-2660.



FRIDAY–SUNDAY, JUNE 8–10

Learn outdoor skills at the Becoming an Outdoors-Woman workshop in Columbia. Open to women ages 18 and up. Workshop includes hands-on instruction in such areas as fishing, archery, rifle, shotgun, canoeing and kayaking, climbing, outdoor digital photography, and more. Contact BB Gillen at (919) 707-0172 or by e-mail at bb.gillen@ncwildlife.org.

SATURDAY, JUNE 16

Join in the fun at the Lake Raleigh Fishing Derby for children from 9 a.m.–3 p.m. on the N.C. State Centennial Campus in Raleigh. Visit www.ncwildlife.org.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

Fur, Fish 'n Game Celebrates 25th Anniversary

Most hunter education courses are offered in a classroom setting, but the Fur, Fish 'n Game Rendezvous offers youths ages 12 to 15 the opportunity to attend a week-long residential camp where they complete the hunter education course in an outdoor setting. The Rendezvous, celebrating its 25th anniversary, will be held at the Millstone 4-H Center in the Sandhills of Richmond County near Ellerbe from July 22–27. Millstone is an American Camping Association-accredited camping facility.

Fur, Fish 'n Game offers two camping levels: one for beginners and an advanced camp. In the beginning camp, children learn about the basics of natural resources conservation. Campers learn and practice safe shotgun, rifle and archery skills. Youths also participate in retriever training, learn about birds of prey, first aid, wildlife identification, trapping, fishing, orienteering and canoeing, among other things.

Hands-on sessions allow younger learners to easily absorb the information within the hunter education manual. Camp sessions are led by Hunter Education officers and other natural resource professionals.

An advanced session is available for youths who already have earned their hunter education certification but are interested in possible careers in wildlife or natural resource conservation. Advanced campers will learn about prescribed burning, wildlife surveying, fish and wildlife population dynamics, tree identification, wildlife damage control and fly fishing. The advanced Fur, Fish 'n Game camp is held in conjunction with the beginner camp..

NCWRC

Campers 12 to 15 years old may attend Fur, Fish 'n Game.

Sponsors of the Rendezvous include the N.C. Wildlife Resources Commission, Wake County Wildlife Club, N.C. Bow-hunters Association, Tar-Pamlico Chapter of Delta Waterfowl, Eastern Carolina Hunting Retriever Club, Great Outdoor Provision Co., N.C. Falconers Guild, N.C. Division of Forest Resources, and many local clubs that sponsor individual campers.

Applications and more information regarding the Rendezvous can be found at www.ces.ncsu.edu/forestry/ffng or by calling (919) 515-5518.

IN SEASON

This month, hunting seasons are open in North Carolina:

Hatchery-Supported Trout Waters: Through June 30.

Crow: Season runs from June 1, 2007, to Feb. 29, 2008.

Check the *2006–2007 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant. $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ **I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $ _____.** *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ **Lifetime Magazine Subscription to** *Wildlife in North Carolina* **$150**
(Please allow up to 6 weeks for your subscription to begin.)

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Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

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Make checks payable to: *Wildlife Endowment Fund*
A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

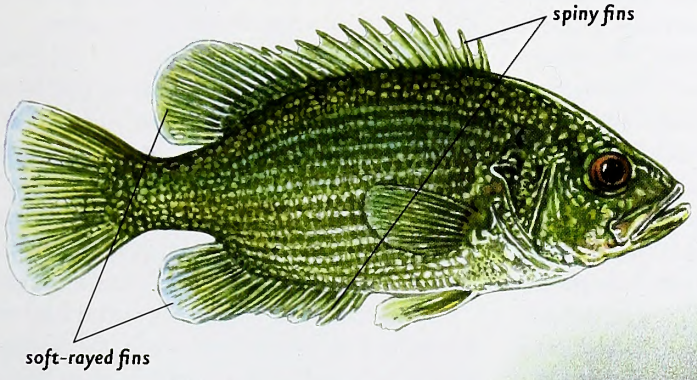
Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

How Do Roanoke Bass Swim In Strong Currents?

written by Clyde Sorenson
illustrated by Jim Brown

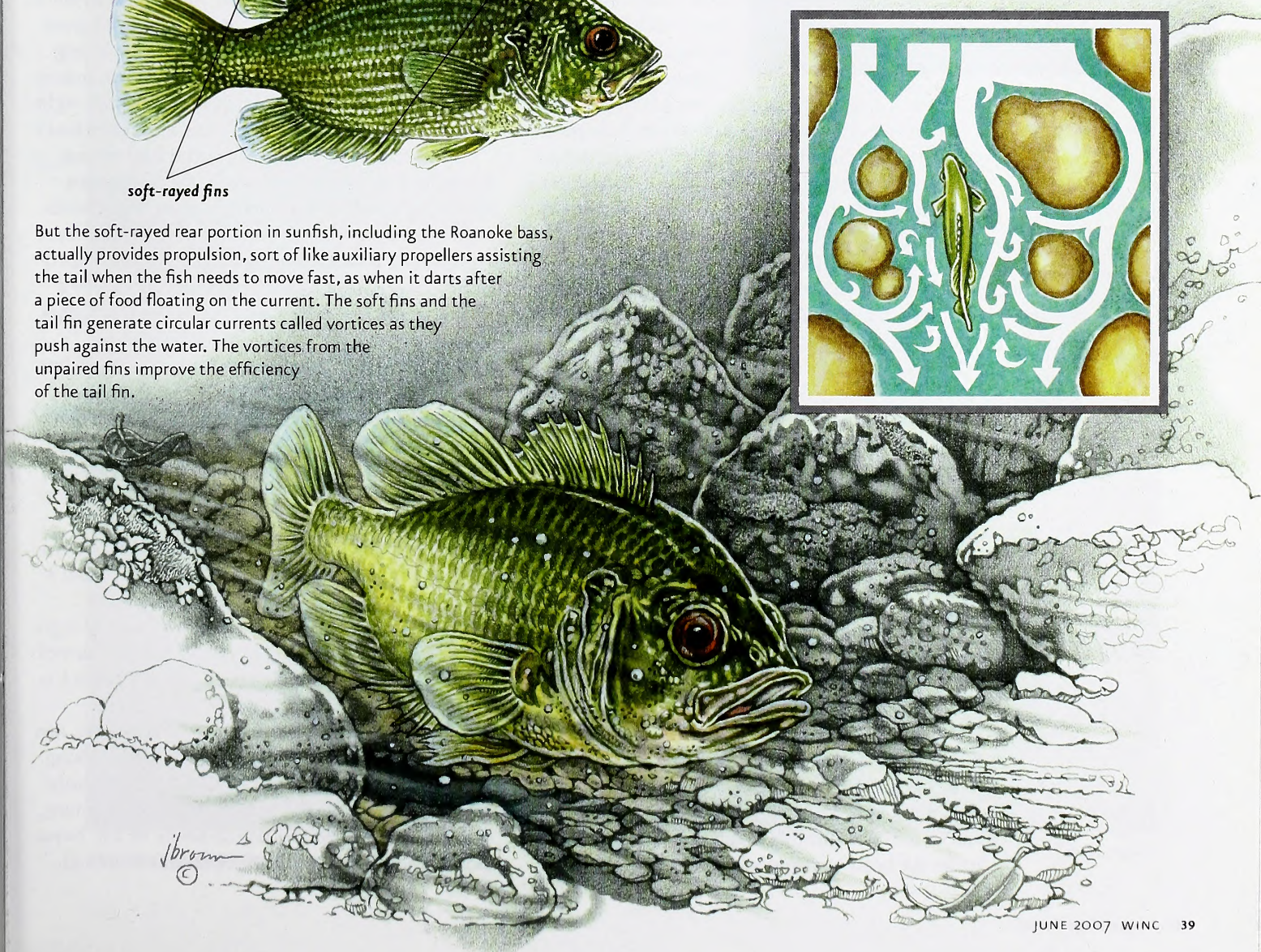
ROANOKE BASS ARE CREATURES of fast water. They have a number of adaptations that allow them to use swift water efficiently.

The fish's dorsal and anal fins are double duty structures—the spiny, leading portions are basically stabilizers that keep the fish from rolling to the side when it swims slowly. These spiny fins fold when the fish swims rapidly.



But the soft-rayed rear portion in sunfish, including the Roanoke bass, actually provides propulsion, sort of like auxiliary propellers assisting the tail when the fish needs to move fast, as when it darts after a piece of food floating on the current. The soft fins and the tail fin generate circular currents called vortices as they push against the water. The vortices from the unpaired fins improve the efficiency of the tail fin.

Rocks and other obstructions in fast currents also generate turbulent vortices. "Resting" Roanoke bass use these vortices to hold their position, using almost no energy, by skillfully making small movements of their head, pectoral fins, and unpaired fins that allow the vortices generated by the rock to roll off the fish's body just like those formed by its fins when it swims. The stream's turbulence essentially pushes the fish upstream, against the current.



Fly-Fishing's Recent Past

written by Jim Dean

Fishermen, by nature, are obsessively single-minded, and our passionate pursuit of all things piscatorial can occasionally be inscrutable, insensitive and insufferable to those not similarly inclined. In poker parlance, we're "all in" for our entire stack of chips much too often, and there's a strong suspicion that we're not always playing with a full deck. But before I introduce the evidence, consider this.

JIM DEAN

Last year, fishermen lost one of their spokesmen when Curt Gowdy died. Curt was host of the popular ABC television show "The American Sportsman," and he closed each feature with his familiar signature "Tight lines, folks." (A tight line hopefully implies that you are hooked up to a fish instead of an old boot). The origin of the phrase is uncertain, although *Outdoor Life* fishing editor Joe Brooks used it to sign his letters and books long before TV introduced it into common usage among anglers.

"There's a strong suspicion that we're not always playing with a full deck."

I never hear "Tight lines," however, without recalling a road trip I made in 1976 to fish Pennsylvania's famous trout streams. That trip was a high-water mark in obsessive angling for me, and also a near disaster in terms of gender insensitivity and political incorrectness. Tom (no last names for reasons that will be obvious) and I had planned a late May trip to fish with our friend Ron who lived there, but unforeseen events delayed our departure until after supper.

"Let's just get going," Tom argued, impatiently. "We'll spend the night somewhere en route."

Near Richmond, I took over the wheel while Tom napped. We looked without success for a motel vacancy south of Washington, and again in York. Finally, at 3 a.m. we pulled into an all-night diner on the banks of the Susquehanna River in Harrisburg. As we fortified ourselves with coffee and breathed the intoxicating dampness of the river, we noticed that the diner's windows were covered with newly hatched mayflies. Patrons watched suspiciously as we stuffed dozens of flies into plastic boxes for later identification.

It was just getting light when we pulled into Ron's driveway near State College. Tom pulled out his guitar and we mounted a stirring rendition of "Fox on the Run" under the bedroom window. Ron loved it, although his wife seemed less impressed. (Ron explained that she had already planned to visit her mother during our visit, but possibly not quite so sullenly or so soon.)

The next week was a blur of hedonistic self-indulgence. The headwaters of Spring Creek flowed past Ron's house, so we most often fished the evening hatches on the lazy meadow stretches that meandered for a dozen or so miles to Bellefonte. We also sampled the famed Fisherman's Paradise stretch of Spring Creek, which was conveniently located near the fly shop Ron and his partner Steve co-owned at that time. Longer jaunts took us to Spruce Creek, Fishing Creek, Penn's Creek, Bald Eagle Creek and Young Woman's Creek—all prime waters.

Regardless of where we were, we fished from first light to dark-thirty, burning energy like hummingbirds. I have a memory of standing in the tail of a Penn's Creek pool at dusk amidst a blizzard of the fabled green drakes with big, nearly uncatchable trout thumping all around me while I sipped the last lukewarm suds of a Genesee Cream Ale. I would have died happily right there (except just let me get in a few more casts first).

Understandably, we did not spend a lot of time housekeeping, and by mid-week, the place was a moldering wreckage of dripping waders, soggy boots, tackle and fly boxes with odoriferous clothing strewn everywhere. Under a haze of fruit flies, a pile of dirty dishes towered in the kitchen sink surrounded by a toxic waste dump of pizza boxes, half-eaten sandwiches, chicken bones and flour. (We made biscuits.)

"Don't sweat it," Ron said, dismissively. "We'll buy some clean dishes."

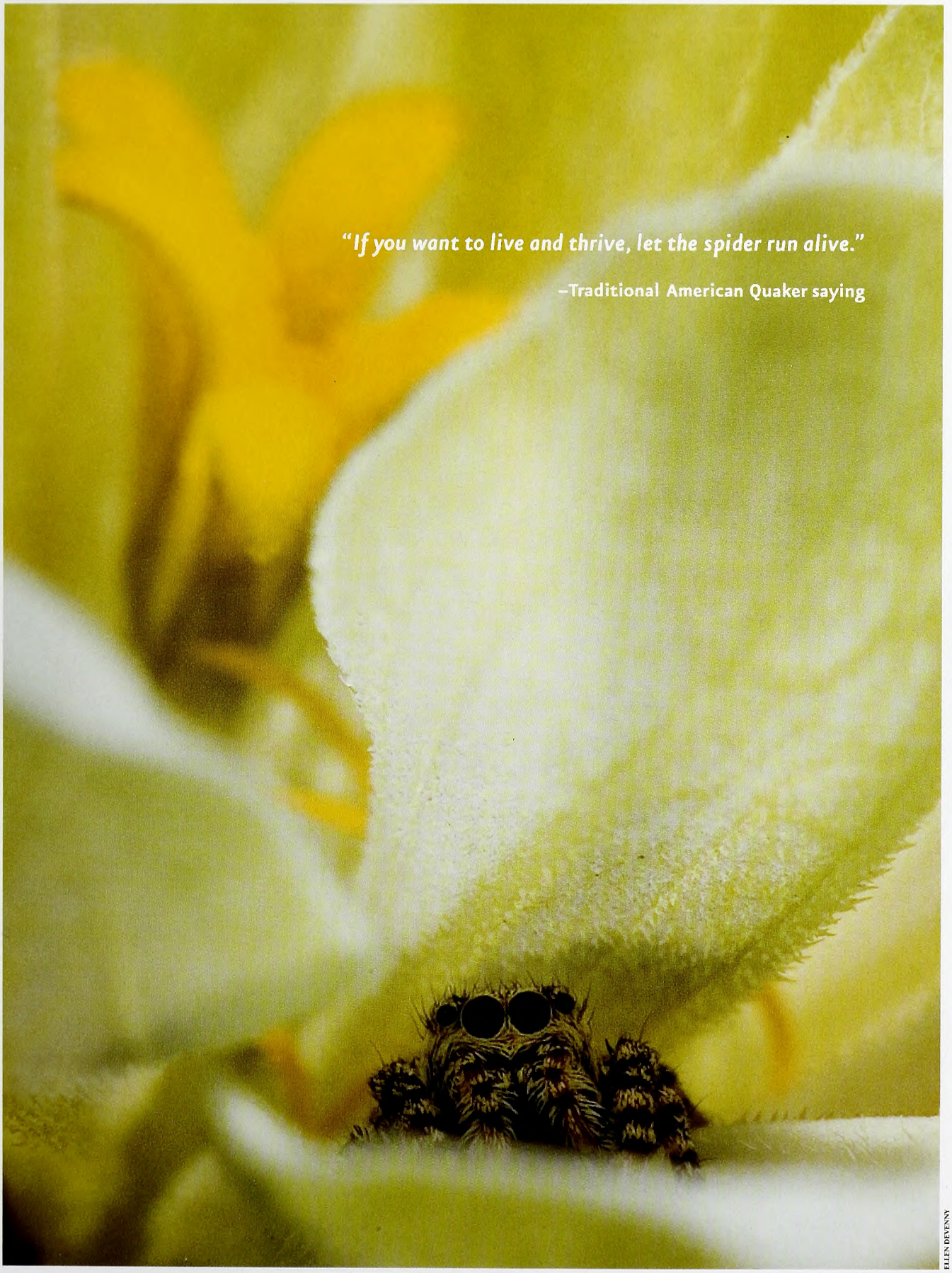
Finally, on the seventh day, Ron surveyed all that we had created and pronounced it monumental. "Maybe we ought to clean up a little," I suggested. "Your family is coming back tonight, and we've got to hit the road soon."

"Yeah, but the hatch is going to be great this morning," Ron mused. "Here's an idea." He swept half a dozen pizza boxes off the table and wrote a note.

Hi Sweetie, The good news is that we managed to get all the fishing tackle out of the house before it burned down. We've gone to Spring Creek, but will be back in time for supper.

Tight lines, Ron

Clearly, it was an inspired solution, but thinking back, I believe it is a good thing that better judgment prevailed. The fishing was, indeed, terrific that morning, but Tom and I helped Ron tidy up before we left. Never did hear how those new dishes worked out, though.



ELLEN DEVENNY

Jumping spider

OUTDOOR MOMENT

IN THE JULY ISSUE

JOHNNY BUCK

CENTENNIAL CENTER

A brand-new wildlife education facility highlights Piedmont animals and habitats through classes and displays.

SUPERLATIVE SQUIRREL

Big, uncommon and often boldly colored or patterned, fox squirrels are not much like the gray raiders of bird feeders.

GULL WATCHING

A closer look at these simultaneously admired and despised birds reveals many species worth viewing by the sea or by the landfill.

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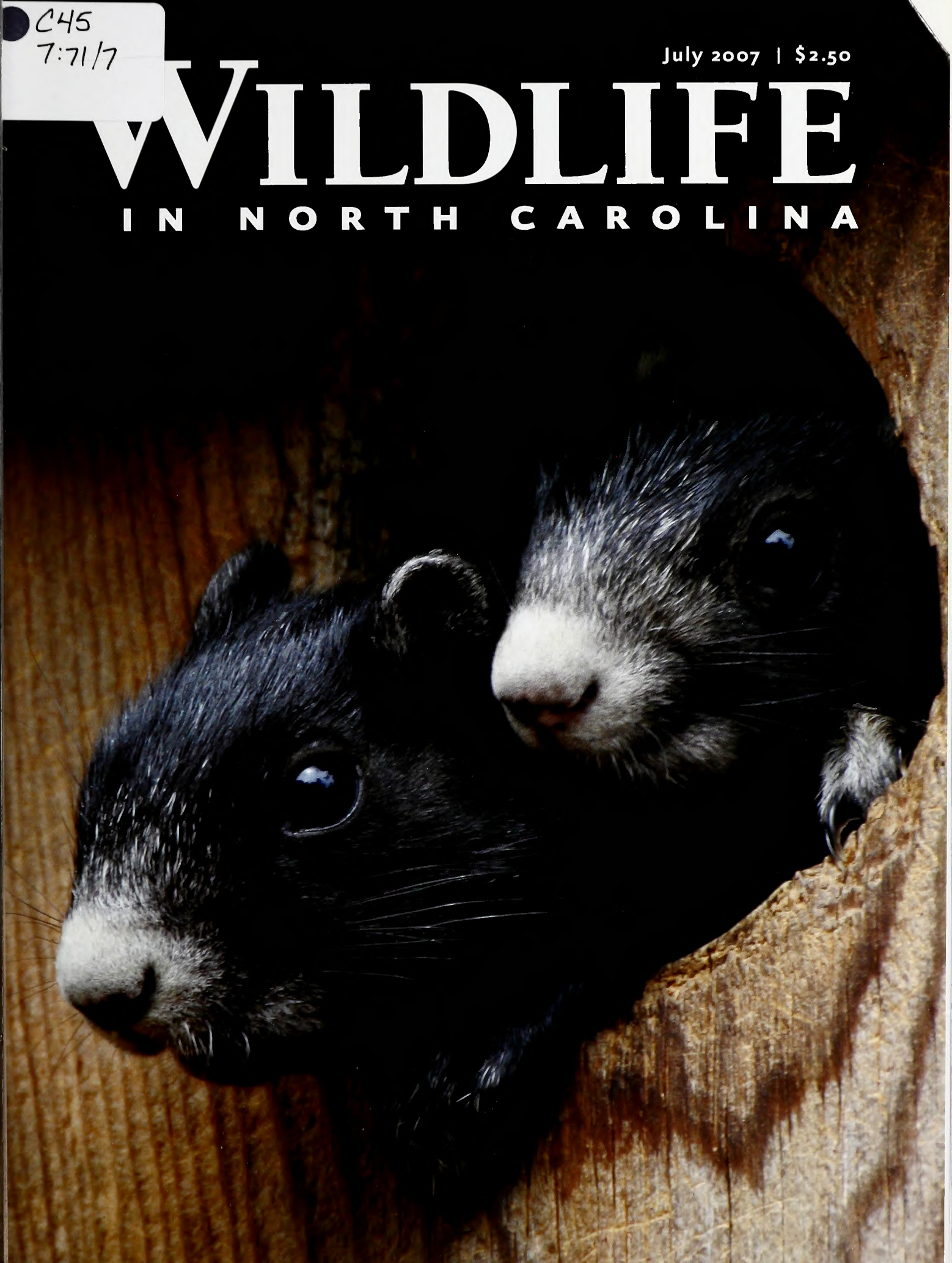

It can be difficult to differentiate between the many species of gulls in North Carolina. Bonaparte's gull is common during winter in areas with fast-moving water. **PHOTOGRAPH BY MARK BUCKLER.**

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WILDLIFE IN NORTH CAROLINA

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Cover: These juvenile fox squirrels look similar, but the species has extremely varied coloring patterns. They are easiest to spot from the Sandhills to the coast. PHOTOGRAPH BY TODD PUSSER.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

The study of nature is a pursuit in which taking a closer look is often rewarded with an interesting discovery. The simplest of efforts—leaning over to watch ants carry away food from your Fourth of July picnic or taking time to obscrve tadpoles in the shallows of your favorite fishing holc—can result in moments of childlike wonder. This tends to hold true cven if the area you are inspecting is your own back yard.

TODD PUSSER

Most of the citizens of North Carolina live in the Piedmont region, which includes Charlotte, much of the Triad and the entire Triangle. We who dwell in the heart of Carolina tend to head for the far reaches of the state when we travel. Certainly, the beach and the mountains offer something different than our gently rolling hills and busy reservoirs, and that is part of what makes this state a great place to live. But a visit to the Uwharrie National Forest can reveal the best of the Piedmont, concentrated in the state's geographic center.

Our continuing series on the N.C. Wildlife Action Plan focuses on the Piedmont this month ("Diversity and Development," page 10), discussing how people in the state's population centers can coexist with prime wildlife habitat both in the Uwharries and right outside the back doors of our homes. That is also the purpose of the new Centennial Campus Center for Wildlife Education ("Focusing on the Center," page 20), a great resource for learning about the animals that live in the Piedmont. Interactive video displays and wonderful exhibits enable visitors to put themselves in the worlds of the animals with which they share critical water and land resources.

"Fox Squirrel Tales" (page 4) takes a look at the uncommon cousin of the gray squirrel, an animal that lives mainly on the eastern fringe of the Piedmont throughout the Coastal Plain. We even take a closer look at gulls, a group of birds that most folks assume are inextricably linked to the seashore ("Ubiquitous and Nonexistent," page 26). But anyone who lives in the Piedmont commonly sees gulls in grocery store parking lots, garbage dumps and lake recreation areas. Love them or hate them, we hope you will find them interesting once you take a closer look.

Greg Jenkins

Greg Jenkins

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Uproar," WINC's initial story on the OLF, ran in December 2003.

The Sound of Freedom

Tell the U.S. Navy that it must stop considering the Pocosin Lakes National Wildlife Refuge as an OLF site (Action Alert, April 2007). This is a unique refuge and one of the most important waterfowl reserves in all of North America. It cannot be controlled by the measures the Navy extols.

The Navy should be ashamed even to consider such a location. They may think they can manage this prime feeding area on the Atlantic Flyway, but the eventual outcome will be the ruination of an irreplaceable fragile environment.

Do not allow this unique refuge to be destroyed. Preserve this important area of North Carolina and North America for future generations.

Barbara J. O'Rand
Southern Pines

To the U.S. Navy: This letter is written in response to your blatant disregard for what this country holds in high esteem: conservationism. I am not necessarily a tree-hugger, but I can see when an action taken by our military goes against the very core of what we hold dear, namely our vanishing wildlife.

North Carolina is a large state with other large open areas on which to land your planes other than near the Pocosin Lakes National Wildlife Refuge, which will instead become killing grounds if you choose this location. We are aware that you plan to control the waterfowl population by "poisoning, trapping, shooting, employing predatory birds, dogs and limiting their feeding grounds." Don't do it!

Show the citizens of this great country and this great state that the military might actually have a little regard for the safety and well being of our state's people and wildlife. Make an effort to do the right thing and find another location. Thanks for protecting our country and not destroying it.

Barbara Ward
Glenville

I do not approve of the OLF. Not only am I concerned about the wildlife, but also the amount of impervious surface that will be added. Water quality will become an issue. I see no benefit at all: air pollution, noise pollution, impervious surface and the destruction of wildlife habitat. This is a no-win situation for North Carolina.

Bill Norris
Peletier

Not only will the Navy's decision to locate a landing field in this precious area affect wildlife, but it will also impact the areas north and south of us that these migratory birds are traveling to and from. This is a rest stop, so to speak, for many of these birds that could easily die without the break and resources. You can see evidence of this in a similar situation with the hummingbirds as they return to Central and South America in the winter, only to find their habitat cut and burned.

Annette Pierce
Laurel Hill

Like Governor Easley, I have been a longtime hunter and fisherman. Unlike Governor Easley, I have also had the privilege of serving in the U.S. Navy. I deeply resent his having commandeered an entire page of your excellent magazine for a bully pulpit from which to vent his concerns about the proposed OLF. Of course, he says he wants squadrons of F/A-18s to be based at Cherry Point, but he doesn't want an outlying field where they can practice carrier launches and landings. How typical of a consummate politician—all benefits, no burdens.

May I call his attention to the outlying field in Atlantic, which has existed for over 60 years and yet virtually abuts the Cedar Island refuge? That field is currently being used by V-22 Ospreys from Marine Corps Air Station New River. Is the governor trying to close that facility as well? If not, why not? What is the difference, other than trying to make political hay out of a current environmental brouhaha?

It might be more helpful if the governor aggressively attacked examples of flagrant legislative corruption, a subject about which he has been amazingly shy. That would be an exercise in real leadership.

Myron C. Banks
Raleigh

I just received my April copy of *Wildlife in North Carolina* with Governor Easley's letter in which he used Pocosin Lakes as a reason to oppose building the OLF. I have followed the articles on the OLF, and most use Pocosin Lakes as a rallying point to oppose this location by stating or implying that Pocosin Lakes will be severely damaged or even destroyed if this site is used. In reality, there is not much left of Pocosin Lakes to save. This and other refuges, national parks and national forests are already being politically destroyed by continually cutting and withholding funds for operation, maintenance and personnel. Since mid-2004, more than 50 miles of roads have been closed in Pocosin Lakes with no money and no personnel to repair them. There is no public access, so why save it?

Whether for or against the OLF, why don't our governor and other politicians, as well as the Wildlife Commission and the news media, try to get action on the lack of funding for our public property which is being allowed to rapidly become unusable and inaccessible? I am a 74-year-old with limited mobility, and since 2004 I can no longer access many areas that I have enjoyed for more than 50 years.

Shellie S. Padrick
New Bern

write us

Letters should be sent via e-mail to **letters@ncwildlife.org** *or through regular mail to Letters,* Wildlife in North Carolina *magazine, 1712 Mail Service Center, Raleigh, NC 27699-1712. Please include your name, address and daytime phone number. Letters chosen for publication may be edited for clarity and length.*

Fox *Squirrel* Tales

An uncommon mammal with a lasting impact provides a link to a biologist's childhood.

Growing up in rural Eagle Springs had its advantages. For one, the small town of just over 300 people is located along the western edge of the Sandhills, a geologic region of North Carolina that stretches over portions of eight counties near the center of the state. The Sandhills area is home to plants and animals found nowhere else in the state, and it was here that I spent my childhood, wandering through the stands of longleaf pine and turkey oak, often accompanied by my dog Buddy.

As a kid who had an insatiable curiosity about the natural world, I could not wait for school to let out so I could head home and roam the woods behind my parents' house in search of frogs, snakes, turtles and insects. I would spend hours walking quietly among the pines, turning over logs in search of snakes or staring through binoculars at a red-tailed hawk soaring high overhead on a thermal.

Each sighting of a wild animal was treasured, like a precious stone tucked away in some dusty old jewelry box. Whether it was a great horned owl or corn snake, I would sit down and write notes about each encounter, sometimes spending hours sketching the animal on notebook paper. One animal caught and held my attention more than any other. Each time I walked up on one in the pines, my pulse would quicken, my hands would grow sweaty and I would have to catch my breath at the sight of such a beautiful creature. That animal was the fox squirrel.

written & photographed by TODD PUSSER

Fox squirrels can have many color variations, from red to gray to black, with white accents. They also can reach the size of a house cat, making them the largest tree squirrels in the Western Hemisphere.

A fox squirrel (*Sciurus niger*) is truly a creature of superlatives. With bodies the size of house cats followed by long, flowing bushy tails, fox squirrels are the largest tree squirrels in the Western Hemisphere. They are also among the most variably colored of all North American mammals. Fox squirrels' coats range from a grizzled gray color to rusty brown to entirely black, with innumerous combinations in between. Fox squirrels west of the Appalachians are typically reddish in color, but those near my home in Eagle Springs are predominately black with white markings on the ears, nose and feet.

I vividly recall encountering one spectacularly colored squirrel one day during my freshman year of high school. It was a typical spring day in the pines, with a gentle breeze blowing from the south and brilliant blue skies overhead. I had been in the woods only a few minutes when I heard Buddy barking in the distance. Thinking she had located a snake, I ran at full speed to her location, only to find her circling a tall longleaf pine, head held high, barking incessantly. I calmed Buddy with a few pats to her head, grabbed my binoculars and stared up into the tree, trying to figure out what had gotten her so worked up.

There at the very top of the pine was a jet black animal with white ears, a white nose, four white feet and a white tail. My initial thought was that Buddy had treed a skunk, but after examining the creature longer, I could tell it was a fox squirrel. I quickly led Buddy back up to my parents' yard and locked her in the dog lot. I crept back down to the pine where the squirrel was located, some 200 yards behind the house. Sitting down on the ground nearby, I watched the squirrel for a good half hour before it decided to move. With binoculars I could see that the squirrel's tail was completely white. I had never seen such vividly patterned black-and-white specimen before and still to this day have never observed a fox squirrel quite like that one.

That same year, I encountered an even more unusual fox squirrel. My good friend at the time, Luke, and I were walking quietly near the edge of an old field and pine forest across the road from my house. We were discussing things that teenage boys typically talk about—girls, cars, snakes, girls some more—when suddenly a large, completely white fox squirrel stepped onto the dirt road 10 yards in front of us. Albino animals are rare, and I had never heard of an albino fox squirrel being observed in the wild. But there it was, standing on its hind legs in the middle of the road, staring right at us. We did the only thing we could do: We gave chase.

Unlike our more common native gray squirrels, fox squirrels typically do not retreat up trees when initially threatened. Instead, they take off running through the woods at a good clip before finally going up a tree in the distance. True to form, the white squirrel ran up the dirt road with Luke and me in fast pursuit. Then it suddenly veered to the right and, like some ghostly apparition, disappeared. We spent the better part of an hour looking for that squirrel, scanning each tree for it, but to no avail. I was just beginning to get interested in wildlife photography then, and I returned to the area many times

over the following weeks in hopes of obtaining an image of the white squirrel, but I never saw it again. White animals stand out in the forest like beacons in the night, and no doubt the squirrel was taken by a predator before I had a chance to photograph it.

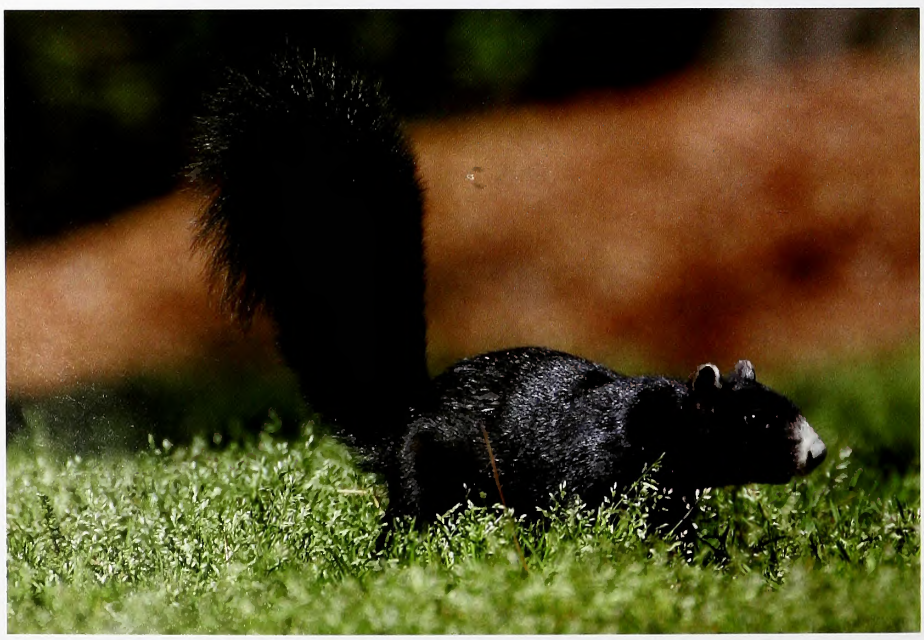
An Early Adventure One of the first fox squirrels I remember observing as a kid was a large black adult in the back yard of our house on a cold January day. It had snowed several inches the previous night, and as Mom cooked breakfast, she noticed a fox squirrel through the kitchen window. As my parents and I crowded around the window to watch the animal mill about the yard, I observed that it was entirely black except for a pair of white ears. The species name for the fox squirrel, *niger*, actually means black, and this animal certainly lived up to its name.

I hurriedly ate my breakfast and ran out to look for the squirrel, which had disappeared leaving nothing but tiny footprints in the freshly fallen snow. I followed its tracks through several acres of woodland. They eventually led to a large oak tree with a cavity some 30 feet off the ground. As I approached, I noticed the fox squirrel's head poking out from the opposite side of the tree, staring at me with watchful eyes. Over the years, I have observed other fox squirrels exhibiting this same behavior: running up the opposite side of a tree from me, only to stick their heads around the edge of the trunk after a few minutes to see if I was still there. As I stood and watched, the squirrel slowly climbed the tree and disappeared into the cavity, leaving me wondering if this might be its home.

Adult fox squirrels prefer to den in tree hollows, often taking up residence in old woodpecker cavities. Imagine my surprise last year when my father called and told me that he had observed an adult black fox squirrel going in and out of a large bird box on the side of his yard in Eagle Springs. I had built that bird box in shop class when I was 14 years old and had hung it in a longleaf pine along the edge of the yard with hopes that a screech owl would nest in it.

I never got an owl to nest there, but 19 years later, a fox squirrel took up residence. Both Mom and Dad enjoyed watching the squirrel's morning visits. The animal would spend its time quietly eating sunflower seeds

Unlike our more common native gray squirrels, fox squirrels typically do not retreat up trees when initially threatened. Instead, they take off running through the woods at a good clip before finally going up a tree in the distance.



In North Carolina, fox squirrels are uncommon species and have lost much of their habitat to development, prompting the N.C. Natural Heritage Program to place them on its watch list.

from the bird feeders hanging in the back yard. Dad, who is very particular about the upkeep of his yard, even threw out some corn for the squirrel. Before long, four adult fox squirrels were showing up to feed on the corn and sunflower seeds. Occasionally one would climb a longleaf pine to grab a tasty pinecone, which was promptly shredded and thrown to the ground, much to my dad's dismay. Fox squirrels throughout the Sandhills seem to prefer longleaf pine seeds, particularly those cut from green cones. You can often tell if a fox squirrel is in the area by searching the forest floor for freshly shucked cones.

A New Family As spring progressed, my parents reported that the fox squirrel that had taken up residence in the owl box had given birth. Four little squirrels could be seen sticking their heads out of the bird box throughout the day. With camera in tow, I immediately hopped into my car to drive to my parents' house. Sure enough, when I got there, I saw the little fox squirrels resting atop the bird box. The mother was sitting on a branch of a longleaf pine nearby keeping watch. What struck me most about the scene was the color variation among the youngsters. The mother had a solid black coat with a gray dusting on the back and a white nose, but two of her young were solid black, one was gray and the other was rusty brown.

A mother fox squirrel nurses her infants for up to nine weeks. Once weaned, the young usually stay close to their mother for another month before becoming independent. I figured the young squirrels would soon leave the safety of the bird box for good, and in two weeks time, my parents informed me that they had. During the heat of the summer, fox squirrel visits to my parents' yard became less frequent.

One afternoon, Mom telephoned me. With sadness in her voice, she told me that a gray-phase fox squirrel had been struck and killed by an automobile on the road in front of the house. I immediately drove over there, only to find one of the young fox squirrels from the bird box lying along the edge of the road. Looking down at the beautiful mammal motionless on the white line, I felt as if someone had hit me in the stomach with a sledgehammer.

Fox squirrels are uncommon in North Carolina, and to find one dead on the highway was almost too much to bear, especially since my parents and I had watched it grow up. I reached down and gently picked up the animal. Stroking its fur, I noticed its body was still warm. Slowly I walked back into my parents' yard and retrieved a shovel. I buried the squirrel under the needles of a tall longleaf pine in the edge of the back yard where I had first observed the species so many years ago.

Finding the dead squirrel emphasizes one of the main impacts affecting fox squirrel populations in North Carolina. Over the years, I have found many road-killed fox squirrels in Eagle Springs and the surrounding Sandhills. Another more serious threat to fox squirrels in the state is habitat destruction. The longleaf pine forests of the Sandhills are rapidly being converted to retirement communities and golf courses. Creatures unique to this region, such as gopher frogs, pine snakes and the fox squirrels, have less space to roam, feed and raise young and as a consequence are declining in numbers. The fox squirrel is on the watch list of the N.C. Natural Heritage Program, a state-funded effort that monitors rare plants and animals.

Over the last 12 years, I have worked as a biologist and wildlife photographer, documenting extraordinary animals around the globe. Among all the amazing creatures I have encountered, the fox squirrels of Eagle Springs will always hold a special place in my heart. Fox squirrels represent a childhood filled with wonder and exploration of the natural world, a world that had fewer fast-food chains and shopping malls. I cherish the memories of watching the large black squirrels milling around in the back yard with my mom and dad, and the time Luke and I chased the white squirrel down an old dirt road, and the time Buddy treed the one that looked so much like a skunk.

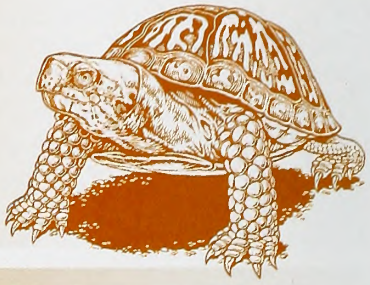
I remain a resident of the Sandhills today, and it is nice to know that I can drive a half hour back to the yard of my youth and watch the antics of the large black squirrels with my mom and dad. Next spring, I will be waiting to see if the same fox squirrel returns to the bird box to raise another family. ◆

Todd Pusser is a marine biologist and a frequent WINC *contributor.*

Diversity and Development

Wildlife Action Plan

KEEP COMMON ANIMALS COMMON



North Carolina's Piedmont, located in the heart of the state, contains a vast array of wildlife habitat that must be protected from haphazard development.

This is the third of a five-part series about North Carolina's Wildlife Action Plan. Each successive story will discuss how the plan is being implemented in a different region, culminating with a final piece about statewide initiatives.

MARCH	INTRODUCTION TO THE PLAN
MAY	MOUNTAIN REGION
JULY	**PIEDMONT REGION**
SEPTEMBER	COASTAL PLAIN REGION
NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

Sunlight dapples the ground with molten gold beneath a canopy of oak and hickory trees. A sweet, soft breeze tickles the leaves into a twisting dance, lifting their edges to reveal the brilliant colors of an Eastern bluebird who sings with the unrestrained joy of newfound love. Skittering around the base of the tree is a brown Carolina anole, snapping up ants on the bark. He pauses, startled by the sudden reflection of light off the surface of a clear stream running nearby. Beneath its cool waters plays a rainbow of brightly colored native minnows gathering over clean gravel patches in search of this year's spawning mate. They are ever watchful, though, for the shadow of a hungry Roanoke bass that lurks behind larger rocks, waiting for the perfect moment of minnow inattention.

Is this idyllic scene in one of North Carolina's state parks or a nature preserve? No, this could be in your own back yard or across the street from where you live. Not only are these treasures of the Piedmont region a recreational and scenic amenity to your community, their presence near you is vital to your quality of life and the health of your family.

The Piedmont includes roughly two-fifths of our state. It stretches from the foothills of the southern Appalachian mountains to the fall line demarking the beginning of the Coastal Plain. Its incredible diversity of habitats includes elevations ranging from 150 to 1,000 feet above sea level. These include rolling slopes draped with rich oak-hickory forests like the one described above, low floodplain forests rippling with the calls of gray treefrogs, large rivers hiding secretive fish of unguessable size, and wetlands stalked by bright-eyed night herons.

Within North Carolina's Wildlife Action Plan, each of the eight terrestrial habitat types and eight river basins that exist wholly or in part in the Piedmont is described, along with its associated species, problems and necessary conservation actions. While the species composition and unique efforts required varies for each habitat, a theme begins to

written by **BRENA JONES**

emerge. It is a picture of a single, overarching threat that hovers over the entire region: the insatiable monster that is poorly planned, sprawling development.

But this is not an unavoidable cost of doing business in our rapidly growing state. Organized, carefully planned, thoughtful development can coexist with a healthy environment and functional wildlife habitat. These habitats and creatures cannot be allowed to fade quietly into extinction for one simple reason—we can't live without them.

ESSENTIAL ELEMENTS FOR LIFE

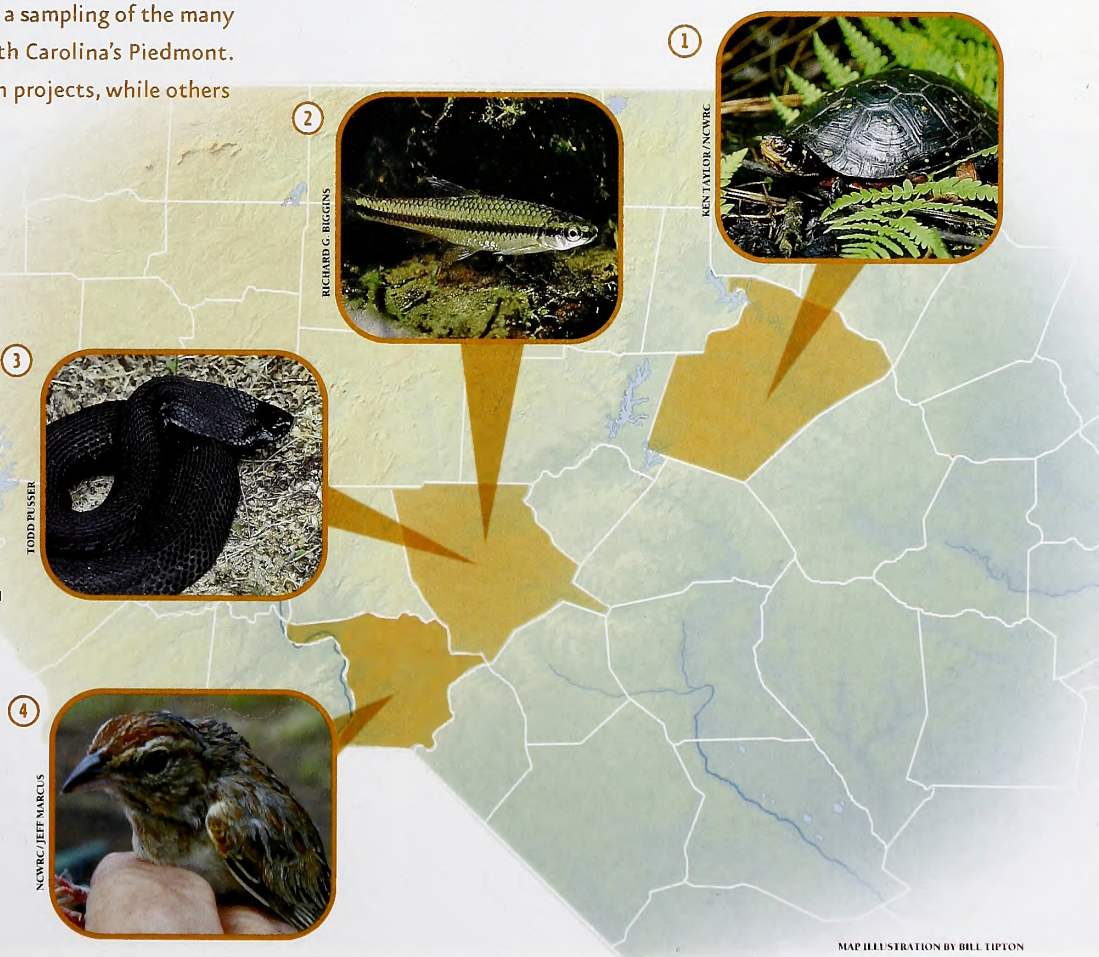
It all boils down to if you'd like to have clean water and clean air. Water supports populations of humans and wildlife, and it feeds the plants that make our oxygen. Healthy streams and intact forests are the most efficient, least expensive, most feasible way to ensure that people continue to have access to clean water to drink, healthy air to breathe, rivers to fish and boat on, and a myriad of beautiful fish, wildlife and plants to enjoy and sustain us. Humanity has known throughout history that clean water is essential to survival because it is needed for drinking, washing, irrigation and a host of other necessities.

Think of your natural surroundings like a living body with waterways as the circulatory system. Headwaters and small streams are the capillaries, indispensable passageways for water, energy and organisms such as fish and aquatic insects. They connect to the larger veins and arteries of rivers. These vessels connect and nourish forests and other upland habitats, which in turn serve as the kidneys and liver for the streams, trapping toxins such as sediment and other pollutants before they enter water supplies. Without your circulatory system to carry energy and oxygen, your organs will quickly fail, and your entire body will suffocate and perish. So too would the natural world without its analogous circulatory system.

We often think of things like wildlife and habitat as disconnected from our daily lives, but the reality is quite the opposite. The evidence comes right out of your kitchen faucet—that water we take for granted comes directly from North Carolina streams, rivers and

CENTER OF CONSERVATION

This is a sampling of the many Wildlife Diversity projects occurring in North Carolina's Piedmont. Some are N.C. Wildlife Resources Commission projects, while others are cooperative ventures.



1. **SPOTTED TURTLE RESEARCH**
   CARY, WAKE COUNTY
   BIOLOGISTS ARE STUDYING HOW THIS AQUATIC REPTILE USES UPLAND HABITAT.

2. **CAPE FEAR SHINER RESEARCH**
   DEEP RIVER, MOORE COUNTY
   HAS THIS IMPERILED FISH RETURNED TO ITS HISTORIC RANGE FOLLOWING REMOVAL OF A DAM?

3. **EASTERN HOGNOSE SNAKE RESEARCH**
   SANDHILLS REGION, MOORE COUNTY
   WHAT EFFECT HAS PRESSURE FROM URBAN DEVELOPMENT HAD ON NATIVE SNAKES?

4. **BACHMAN'S SPARROW RESEARCH**
   SANDHILLS GAME LAND, RICHMOND COUNTY
   INTENSIVE LONGLEAF PINE MANAGEMENT MAY HAVE INCREASED POPULATIONS OF THIS BIRD.

KEN TAYLOR/NCWRC
RICHARD G. BIGGINS
TODD PUSSER
NCWRC/JEFF MARCUS
MAP ILLUSTRATION BY BILL TIPTON

NOT ALL OPEN SPACE IS CREATED EQUAL

Many people in the rapidly developing Piedmont are recognizing the importance of protecting undeveloped areas that provide wildlife habitat, scenic vistas and opportunities for outdoor recreation. This wide range of unpaved areas, often called "open space" or "green space," can be private or public and may be managed in different ways. Many counties and municipalities protect open space as working farms, public parks and greenways, or as undeveloped portions of private lands. Some local governments require developers to help buy open space or set aside an undeveloped portion of new subdivisions.

However, not all undeveloped land will contribute equally to wildlife conservation or wildlife-related recreation. Some entities define open space to include golf courses and soccer fields. The Wildlife Action Plan provides guidance to help maximize the conservation bang for the open space buck.

LOCATION MATTERS

- Open-space protection should be steered toward intact natural habitats of significant size. With the guidance of the Wildlife Action Plan and the aid of many partners, Wildlife Commission biologists are consolidating maps of priority species and habitats in the Piedmont to assist natural-area protection.
- Placement of protected open space along streams and rivers often helps achieve multiple conservation benefits for terrestrial and aquatic habitats.
- Open space should be clustered. It is often better for wildlife to have one large block of natural habitat than several smaller, fragmented blocks. Likewise, wider greenways are better than narrow ones. However, even small protected areas provide some value.
- Open space should be connected. Wildlife needs to be able to travel between habitat patches. Linking protected areas with corridors also creates an opportunity for a greenway or recreation path. This often requires planning across jurisdictional boundaries.

MANAGEMENT MATTERS

- Within open space, managers should maximize the amount of natural vegetation and minimize the amount of frequently mowed area.
- Many municipalities think that parks should include ball fields and recreation centers. Outdoor recreation opportunities such as hiking, bird watching and canoeing are important, too.
- Management should be appropriate to the natural habitats present. Managers and landowners should look for habitat-restoration opportunities.

Just as it is important to plan housing, roads and businesses so people can function well, it is equally important to plan for green infrastructure to ensure that wildlife species and natural systems will continue to function well. The Wildlife Action Plan helps to promote this proper planning for wildlife.

– Jeff Marcus

reservoirs. Under the surface of these waters, freshwater mussel populations filter enormous amounts of water, feeding on algae and bacteria and keeping streams clear. These mussels have their limits, though. Continuous inputs of sediment, ammonia, pesticides and other chemicals can strain these sensitive organisms to the breaking point, making mussels an excellent barometer of our waterways' conditions. Current declines in our native mussel populations are a red flag signaling to us that all is not well in our waters.

Sport fish such as bass, bluegills and crappies depend on the presence of abundant aquatic insects and smaller forage fish in order to survive. These insects in turn depend on pollutant-free water. Are you beginning to see a pattern? Let's look at those forests surrounding the streams.

Creatures underwater depend on leaves and woody debris dropping from nearby trees, providing food and places to hide. But why should it matter to us if a stream bank is forested or not? For one thing, wide buffers on streams dramatically abate flooding problems in several ways. Tree roots and vegetation stabilize the stream channel, preventing the erosion that creates tall, cliff-like banks and cuts off a stream from its floodplain. When a stable channel with low banks fills with water, it quickly spills over into the floodplain, where water spreads out and slows down. This slow water can be much more easily absorbed into the soil. Slow water also readily drops what it is carrying: sediment and debris that can be deposited in the riparian forest before it reaches a river or reservoir.

A flooding stream trapped in a deep, eroded channel has no way to slow down, and as we know, fast water is powerful. It will simply cut away at its own banks even further, and when it reaches the end of its mad race, it will dump all of its dirt and debris into a reservoir. In addition, this fast-moving water will have no chance to filter back into the soil and replenish the groundwater, the consequence of which will be clear to anyone who relies on a well for water.

Counterclockwise from top right: Rapid residential development threatens water-loving creatures such as the wood frog (shown in mid-transformation) and the Carolina heelsplitter. This clear-cut around a creek makes it more difficult for birds such as the yellow-crowned night heron to live in the Piedmont.

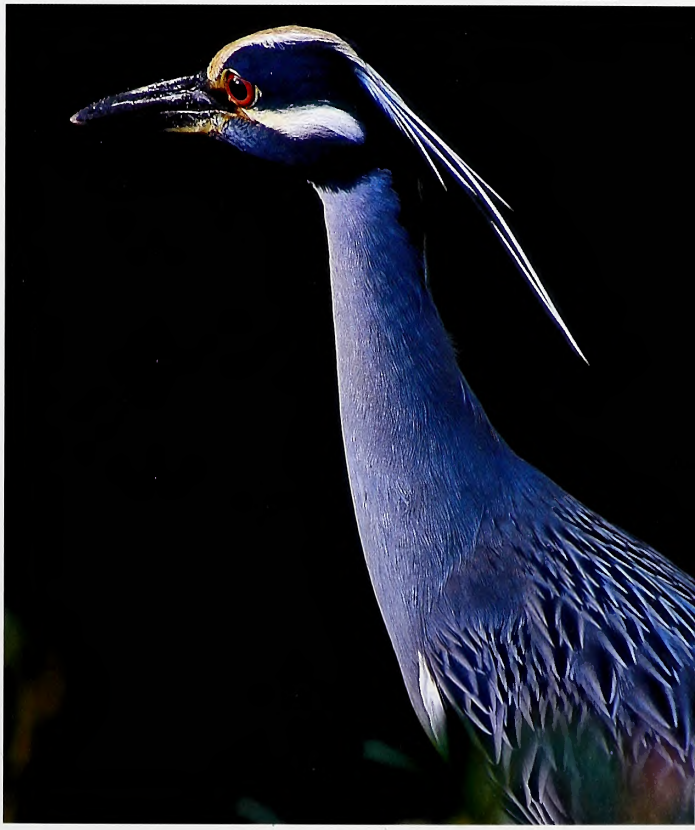
NCWRC

JONATHON MAYS/NCWRC

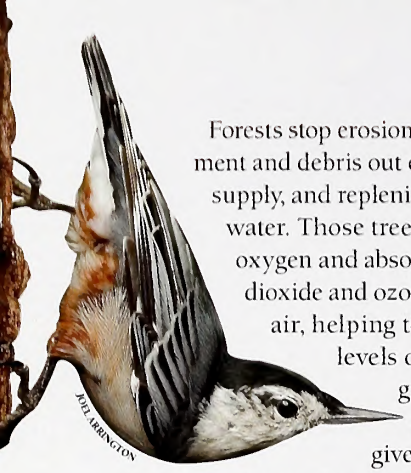
KEN TAYLOR/NCWRC

KEN TAYLOR/NCWRC

These *habitats and creatures cannot be allowed to fade quietly into extinction* for one simple reason—*we can't live without them.*



MELISSA McGAW



The white-breasted nuthatch and the marbled salamander suffer from the loss of Piedmont habitat such as this wetland.

Forests stop erosion, keep sediment and debris out of our water supply, and replenish groundwater. Those trees produce oxygen and absorb carbon dioxide and ozone from the air, helping to reduce levels of these greenhouse gases. They give shade to the stream, maintaining water temperatures at livable levels for fish, salamanders, insects and mussels. A riparian buffer also provides diverse habitat for songbirds, deer, frogs and other beneficial and beautiful wildlife that many people enjoy hunting or viewing. It is also important to note that nationwide economic studies have proven that living within reach of such amenities as this natural bounty of recreational and scenic opportunities raises your own property values.

And it does all this for free. Conserving natural forests, wetlands, streams and prairies is exponentially cheaper than paying for engineered stormwater treatment, multi-stage drinking water purification, repair of flood damage, environmental mitigation and pricey sediment retention practices that are only a fraction as effective as natural processes.

MAKING OPPORTUNITIES

But aren't North Carolina's numerous parks and preserves enough? (See "Not all open space is created equal," page 12). The sad truth is that the human population across our state is exploding while available natural resources continue to shrink. Many Piedmont streams are already listed as degraded and unable to support recreation or aquatic life, and forests are being lost daily. If we are to continue to have access to clean water and air, we must do better at protecting the diversity and habitats that we still have. Isolated parks won't do the trick—these habitats must be large enough and connected enough for animals to move freely from system to system.

As communities struggle to keep pace with off-the-charts growth, scrambling for water, sewer, space and roads, they lose control of how this growth occurs and where it settles its bulky footprint. In a rush to cash in on the housing boom, developers stripped massive tracts of land of vegetation, causing tons of sediment to flood into streams and rivers. As forested stream buffers fall to bulldozers, flooding increases in severity and frequency, water becomes increasingly polluted by runoff, and the threat to municipal water supplies grows.

Tentacles of scrape-and-build subdivisions extended out from cities, unchecked by site-specific planning, proactive stormwater control or effective resource conservation measures. Where they landed, much has been lost and communities are paying the price in traffic congestion, ozone warnings and contaminated streams.

The sad story is long and filled with missed opportunities. The developers, residents and municipalities that contributed to this sprawling growth were certainly not driven by bad intentions. Most of the new home buyers were simply seeking an affordable house in a safe, peaceful neighborhood away from the concrete jungle of the city center. Ironically, the pursuit of a natural haven away from the city has brought the pavement and traffic with it. The cumulative impacts of poorly planned sprawl now threaten many of the important wildlife species and habitats in the Piedmont and diminish the values many homeowners were pursuing.

Piedmont residents have a chance to push the pendulum the other way, to change how we grow and to build communities that are livable and attractive without sacrificing essential natural resources. And the Wildlife Action Plan gives us one tool to help get it done. ◆

Brena Jones, Kacy Cook and Jeff Marcus work in the Piedmont for the NCWRC's Wildlife Diversity Program. Jones is regional nongame aquatic biologist, Cook is regional land conservation biologist and Marcus is region supervisor.

TOWN PLANNING WITH CONSERVATION IN MIND

When determining how any area should be developed, it is important to consider not only where new homes and businesses will be located, but how they should fit into the overall fabric of the landscape. This is where watershed and regional planning comes into play. Ecologically sound decisions can save money, increase property values and expedite permit processes and sales. A land use plan that addresses growth needs and conservation needs can be a powerful tool in guiding a community forward without sacrificing natural resources and the quality of life.

Each town also has the ability to protect important resources and habitat by controlling stormwater and preserving floodplains, forested areas and headwaters using tools such as ordinances and zoning. Overlay and cluster zoning gives local governments the tools to grow while preserving the integrity of their watershed. For example, the Town of Cary has enacted an ordinance stating that the riparian zones along streams may not be included in platted lots, preserving these natural areas for public enjoyment and watershed health.

– Brena Jones

READ AND LEARN MORE

Cary's riparian buffer ordinance:
www.townofcary.org/depts/dsdept/engineering/engproj/stormwater/bufferfacts.htm

Low-impact development:
www.epa.gov/owow/nps/lid/

Minimizing impervious surfaces:
www.stormwaterauthority.org

Smart Growth for communities:
www.smartgrowth.org

Cluster development and conservation subdivisions:
www.uwsp.edu/cnr/landcenter/tracker/summer2002/conssubdiv.html

Bioretention areas and rain gardens:
www.bae.ncsu.edu/topic/raingarden/

Tools for land-use planning:
www.smartcommunities.ncat.org/landuse/tools.shtml

GETTING AHEAD OF GROWTH

The Greater Uwharries Conservation Partnership works to preserve a pristine patch of the Piedmont

Life in the Uwharries is different. People know their neighbors, many of whom still make a living from the land. There are more than 50,000 acres of national forest and game lands where most rivers and streams have high water-quality ratings. Rare North Carolina freshwater mussels and fish are supported by diverse aquatic insects and systems. Despite this, the region faces the same growth issues as cities and suburbs because the infrastructure and development ordinances that spur sprawl exist there, too.

The greater Uwharries region is one of North Carolina's greatest opportunities. For now development is manageable, and lifestyles and culture are rural, but the health of the region's wildlife habitat depends largely on private land management and planning. Haphazard growth leads to degradation of terrestrial and aquatic wildlife habitat, but there can be responsible development if local governments encourage open space conservation, and growth is based on land-use plans.

To that end, the Greater Uwharries Conservation Partnership is focused on helping the region harness its opportunity for balanced land use and growth founded in high-quality wildlife habitat and a high-quality of life. Comprised of 12 conservation- and economic-based organizations and agencies working together, the partnership targets funding for conservation and sustainable economic growth in the region and brings information in North Carolina's Wildlife Action Plan to the counties and landowners of the south central Piedmont.

Until recently, the greater Uwharries thrived mainly on agriculture and manufacturing. The region now has the opportunity to expand and revitalize its economy by inviting new residents, retirees, tourists and recreationists who appreciate the natural, tranquil character of the area. The possibilities are exciting. By planning with conservation and place-based economics in mind, community leaders can secure the way for economic growth and needed jobs, many of which are attracted by an aesthetically and culturally pleasing environment.

Failure to conserve these natural and cultural assets while the region grows will likely relegate this region to the sprawling suburban development of strip malls, traffic congestion and poor water quality which are common symptoms of unplanned growth in neighboring counties. Without comprehensive planning, this unique rural area could begin to look and feel the same as its metropolitan neighbors.

WHAT YOU CAN DO

- Sign on as a supporter of Teaming with Wildlife, the coalition which secures State Wildlife Grant funding from the U.S. Congress.
- Be informed about land-use and planning policies and ordinances affecting your county and municipality. Obtain information from your local, state and federal government offices. County commission board meeting minutes can usually be found on the county's Web site. Sign up for newsletters from your state legislators. It's surprising how informative meeting minutes and legislation can be.
- Write your county commissioners and state representatives to share your opinion and constructive ideas.
- Contact your local land trust, the Wildlife Commission or the N.C. Department of Environment and Natural Resources for technical guidance if you are interested in trying to conserve resources. These organizations are less interested in regulating landowners and development than they are in working cooperatively with landowners and government to find win-win solutions.
- Pay attention to road and development infrastructure plans and land sales so you have time to weigh in on any planning decisions.

—Kacy Cook

JACK DERMID

MELISSA McGAW / NCWRC

Newfangled Noodling

Ever heard of fishing with scuba gear and a water heater? Read on to learn about the 21st-century version of hand-grabbing for catfish.

written by Jack Horan illustrated by Jackie Pittman

The only signs of the commotion below Badin Lake were the bubbles rising to the surface and a yellow tether ball bobbing on the water. T. J. Penninger, watching from an anchored boat, kept his eyes on the ball, hoping it would disappear. It soon did. That was the signal he was looking for. "Yep! He's got a fish. Yessirrr!" Penninger shouted. "That ball should come exploding out of the water any second now."

We stared in anticipation on this hot July day. About 15 seconds later, the ball popped to the surface. Next to it, a huge brown catfish roiled the water. It was lassoed by a rope tied to the ball. The flathead jerked the ball along in erratic circles. "That's a good fish, a real good fish!" he exclaimed.

Next, Paul Cleveland emerged from the lake. Clad in a black wetsuit and wearing scuba gear, Cleveland brushed back his face mask, revealing a broad grin. He pulled the rope toward him and held up the head of the flailing catfish. This was no hook-and-line prize. Cleveland had prodded the fish from its hiding place in a specially designed tank on the bottom. As it tried to swim out, he had grabbed it by the lip, horsed it into submission and put it on the tether-ball stringer.

Cleveland had just demonstrated the art of extreme catfishing. Called hand-grabbing, grabbling or noodling, it's a good-old-boy sport practiced throughout the South. It is important to note that it does require a basic fishing license. Hand-grabbers shun rods and reels and feel with bare hands for resting fish under logs or beneath the banks of lakes or rivers. They use a hand-to-mouth technique to nab startled fish and hold on for a bucking bronco ride. In Oklahoma, it's a competitive sport at the Okie Noodling Tournament. The hands-on winner in 2006 wrestled up a 61-pound flathead.

©07
JP Hansen

Noodling Mania

Cleveland, 45, of Charlotte, may be North Carolina's top catfish wrangler. He certainly has the numbers to back it up. In the past six years, Cleveland and 30-some adventurous friends have brought up 1,094 flathead and blue catfish from Badin and Tuckertown lakes near Albemarle. The combined weight of the fish exceeds 12 tons—24,012 pounds to be exact, according to detailed logs that Cleveland keeps.

Cleveland himself has grabbed 522 catfish, some weighing as much as 50 to 60 pounds. "You don't have to be crazy to do this," he joked of his underwater escapades, "but it sure helps." Cleveland, who grew up in Mississippi, learned hand-grabbing from his uncle, Tom Cleveland, and cousin, Craig Cotten. He hand-grabbed his first fish at age 23.

Tom, a plumber by trade, took the sport to a new plateau in the 1970s. He got the idea to create artificial spawning habitats to draw fish. As cavity spawners, catfish seek hollow logs and holes in banks. Tom would cut one end off an old water heater and weld on a tapered neck. The finished tank, shaped much like a beer bottle, became an underwater suite for the amorous fish.

Traditional hand-grabbers hold their breath to locate and clutch a fish. But it takes too long to descend and wriggle into an underwater tank for breath-holding to be feasible. So Tom Cleveland advanced the sport another step. He introduced scuba gear to give noodlers the additional time needed to set up for the grab, pry out a secluded fish and subdue it.

Paul Cleveland moved to Charlotte in 1999 and wanted to continue hand-grabbing in North Carolina. He began building his own tanks, which he calls boxes. He, too, uses water heaters, welding on a neck that's about 18 inches across. He also builds boxes from shipping crates. As of 2006, Cleveland had placed 53 boxes in Badin and Tuckertown lakes on the Yadin River. Most lie in water 7 to 8 feet deep, anchored by rocks.

Hand-grabbing season follows catfish spawning season in mid-May to mid-August. Nearly every warm-weather weekend, Cleveland and friends go cat hunting. They don masks, air tanks, regulators (breathing devices) and weight belts. Wet suits and gloves protect them from cuts and scrapes.

Bringing Them In

I joined Cleveland and Penninger, 25, on a hand-grabbing trip last summer. Cleveland lamented the fact that 2006 hadn't been as productive as previous years. "I've caught 2,500 pounds already since Memorial Day," Cleveland said. "I should be at about 3,500 pounds right now. I'm having a terrible year so far." Most hand-grabblers, not to mention hook-and-line anglers, would be delighted to have bagged more than a ton of fish in six weeks.

Cleveland finds his submerged tanks by lining up two trees or other landmarks from his boat. He then wades out and feels around with his feet until he detects a tank. He descends, holding a 10-foot copper rod that's clipped to 20 feet of rope. This rope is tied to the yellow ball that floats on the surface. The rod is a prod, with a strand of barbed wire attached to one end. At the other end hangs the tag end of the rope.

Sitting on the bottom, Cleveland sticks his legs into the 8-foot-long tank, sealing the opening with his lower torso. His left hand poised to grasp, Cleveland inches the rod forward with his right hand, making ever-widening circles. When the barbed wire pricks a catfish, he'll feel a mini-earthquake as the fish bumps around. That's when the fun begins. The trick is to lip the onrushing fish and cradle it between his knees to prevent it from twisting in an "alligator roll." Then he passes the rope into the last gill flap and out the catfish's mouth, ties a half hitch and leans back to let the agitated fish swim out.

On this day, no one was at home at the first 10 tanks. Concealed in the 11th tank, however, was the 51-pound flathead. "When I ran the rod down there, this big fish torqued the rod and came into my lap real hard," Cleveland recounted moments later. "I reached down and grabbed his mouth, and he started twisting. I just locked him up with my legs. It slid across me. I could tell by the mouth how big this bottom jaw is. I told you coming up I got a big fish."

Aboard the boat, Penninger readied a certified scale as Cleveland lifted the creature from the brown lagoon. The scale leveled off at 51 pounds. A trophy to be sure, but not a personal record. His largest flathead ever weighed 65 pounds; his largest blue, 68 pounds.

Soon, the flathead was swimming freely in the lake. Cleveland said he releases most fish, particularly those over 30 pounds. "We've kept probably 15 fish this year," he said, sometimes giving them to bank fishermen who watch wide-eyed from the shore.

Hand-grabbing isn't for the fainthearted or the claustrophobic. It can be dangerous. "You can't believe how hard and fast it hits you," he said of the fish, which seems like a swimming torpedo. One frantic fish rammed a 200-pound friend in the stomach. The blow sent him backward out of the tank. Other fish have knocked off regulators, masks and shoes. A 13-pounder once gave Cleveland a 1½-inch cut and a black eye after smacking his mask.

In 2003, a blue catfish that Cleveland believed was in the 80-pound range (the scale broke) gave him a thrashing. "That fish hurt me. That was the only fish that ever beat me up. Both my arms were bruised," Cleveland said. "He was just nasty. We opened his mouth, and he was actually growling at us."

What else could be hiding in those tanks? Not much, Cleveland said. He drills holes to keep air pockets from forming. That eliminates the possibility of snakes or turtles lurking inside. Largemouth bass? Nope. The only other fish he's found are occasional bluegills.

Now it was Penninger's turn. In his rookie year in 2005, he caught 90 fish. His dive to one tank produced not one but two flatheads, a 17- and a 23-pounder. That's not unusual; courting couples share a chamber. All told that day, Penninger and Cleveland grabbed eight fish. For all of 2006, Cleveland and friends ended up hauling in 145 catfish weighing 3,369 pounds.

What inspires Cleveland to spend his weekends wrestling big cats? "I needed something to challenge me," he said. "I don't think anyone can beat me in this sport. I want to catch 30 fish in a weekend."

Cleveland's goal is to break the state hook-and-line record for the two catfish species. That would mean topping the 78-pound flathead caught in the Cape Fear River in 2005 and the 89-pound blue caught in Badin Lake in 2006.

But if he grabs a record-breaking fish, he won't get official recognition. To qualify for a state record, N.C. Wildlife Resources Commission rules state a fish must have been caught on hook and line "in a sporting manner."

That disqualification doesn't discourage Cleveland, who's content to stay on the hunt even if his name never appears next to a champion fish. "If I caught the state record," he said, "in my mind, it would be the state record. I'd be happy with it."◆

Jack Horan is outdoors correspondent for The Charlotte Observer *and an occasional contributor to* WINC.

A firsthand account of a first-time handgrabber

I tried my hand at hand-grabbing for the first time ever on Badin Lake. We pulled up to one of Paul Cleveland's tanks that lay in about 8 feet of water. Strapping on scuba gear (I'm a certified open-water diver), I waded into the yellowish, murky soup. Visibility was about 12 inches. T.J. Penninger stayed on my right in case something went wrong.

I found the tank's opening and sat on the bottom. I shoved my legs inside—a spooky feeling. I kept my left hand at the ready and, as Cleveland recommended, adopted an aggressive posture. With my right hand, I pushed the 10-foot, barbed-wire-tinged rod forward.

I struck something. I heard telltale rumbling. A second or two later, something brushed my left leg. I grabbed. To my surprise, I caught a catfish by the lip. I gripped the flathead tightly as it shook, forcing it between my knees. I groped along the fish's gills but, in the frenzy, couldn't get it roped. Penninger intervened and tied the flathead.

My fish was small—a 10-pounder. Fortunately, it wasn't a monster 51-pounder like Cleveland had just caught. Hot day, cool water. Nice starter fish. Hey, this is fun!

—*Jack Horan*

JACK HORAN

JACK HORAN

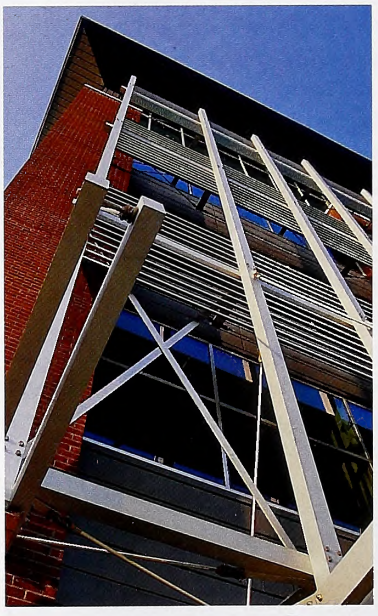
Paul Cleveland (top) proudly displays a 54-pound blue catfish caught through his innovative and unique form of noodling. T.J. Penninger (above) shows off the bounty of a trip holding both a 54-pound blue catfish and another 49-pounder.

FOCUSING ON THE CENTER

WRITTEN BY GEOFF CANTRELL | PHOTOGRAPHED BY MELISSA MCGAW

WALK IN THE DOOR of the Centennial Campus Center for Wildlife Education in Raleigh and you immediately face a large satellite image map of North Carolina. It's a big hello and a proper introduction to the final installment in a trio of regional wildlife education centers across the state operated by the N.C. Wildlife Resources Commission. The Centennial Campus Center for Wildlife Education joins sister centers in the mountains and at the coast in celebrating the unique regions of the state.

The Centennial Campus Center for Wildlife Education is located, appropriately enough, on the Centennial Campus of N.C. State University, a "technopolis" of residential, academic, corporate and government entities. There are classrooms, an auditorium showing a documentary film, laboratories and other things you would expect in a university setting. Then there are the things you might not.



"There are lots of buttons to push, which kids like," Karen Millendorf says while waiting for her kids to finish a nature program. "The exhibits are eye-catching, informative and fun, and so well laid out. The whole experience is great."

Each of the three wildlife education centers is tailored for a specific region and its own natural resource message. The Pisgah Center for Wildlife Education and adjacent Bobby Setzer Fish Hatchery near Brevard examine the wildlife and aquatic habitats of the Mountain region, and the Outer Banks Center for Wildlife Education at Corolla explores the heritage and ecosystems of the coastal region. A related facility, the John E. Pechmann Fishing Education Center in Fayetteville, is expected to open in the coming months and will provide fishing instruction and aquatic habitat information.

"Each wildlife education center has a unique mission," program coordinator Marti Kane says. "If you participate in a black bear program here at Centennial, it will have a different focus than one at Pisgah or the Outer Banks. At Centennial, we concentrate on conserving wildlife in an expanding urban environment. Our educational themes include the use of technology in wildlife research and education, urban wildlife management and sustainable living.

"So a black bear program here might include radio telemetry and other technologies used to study the bears, as well as activities that emphasize human-bear interactions in a suburban environment."

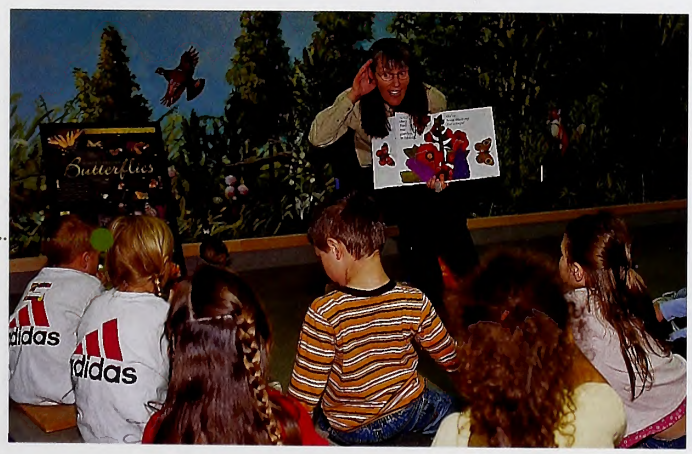
Those human-bear interactions have made the news and grabbed plenty of attention recently. So have nuisance encounters and increased vehicular collisions with white-tailed deer. The Piedmont is a region of change, where yesterday's family farm is today's subdivision, and woodlands are crisscrossed by new highways and job opportunities. According to the U.S. Census Bureau, the Charlotte area ranked seventh in the nation in adding the most people in 2006, and Wake County was 11th in population growth the year before. For the Centennial Campus Center for Wildlife Education, those changes and the resulting effects on the landscape are a big part of the message.

PETER HUTSON

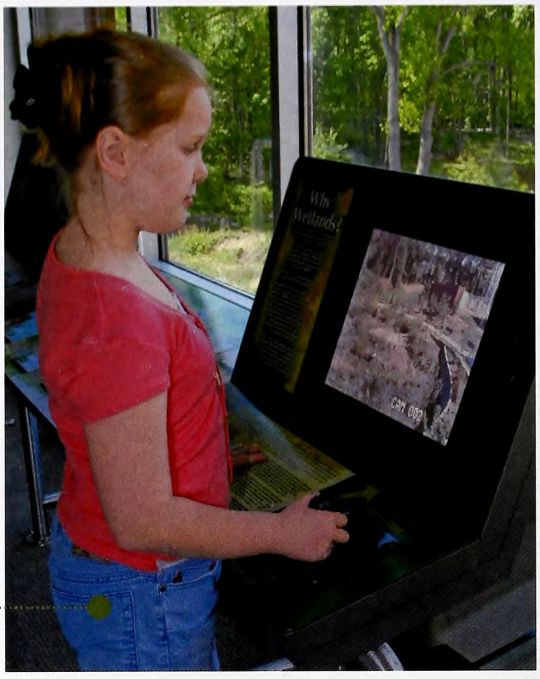
LOCATED IN THE PIEDMONT, THE NEW

Centennial Campus Center for Wildlife Education

IN RALEIGH HAS FILLED THE CENTRAL GAP BETWEEN EDUCATION CENTERS AT THE COAST AND IN THE MOUNTAINS.



Blythe Waters (top left) has fun with the roller ball control at one of the interactive nature displays. Educator Marti Kane leads the Birds & Butterflies event (left) in one of the center's classrooms, and a child gets ready to compete in the personal flotation device relay (above).



Grace Brown (above) tries her hand at a nature observation remote camera, and a group of children observe a Piedmont habitat display (right). A girl tries out a net (below) on the center grounds during an aquatic workshop.

"This is an ideal showcase," says center director Randy Cotten. "We're only two miles from I-40 and close to downtown Raleigh, so it is convenient for visitors, and it gives us a realistic portrayal of what's happening with urban wildlife."

Outside the center are two surrounding acres of wildlife habitat, so the outdoor aspects complement what's indoors. "There's a virtual reality aspect to some of the interactive displays, where visitors use the latest technology to learn about species and habitats of the Piedmont," says Ginger Williams, chief of the Division of Conservation Education. "Then there's the just plain down-to-earth aspect, when you are face to face with an American goldfinch or stooping over to identify a strange paw print in the mud."

The staff already has more than a year of classes and public events under its belt, including the afternoon Fisheries and Wildlife Seminar series, which has proven quite popular. "The Fisheries and Wildlife Seminar series is the fruit of a time-honored partnership between the Wildlife Commission and the Fisheries and Wildlife Sciences Program at NCSU," Kane says. "Six seminars are held each school year, beginning in September and ending in April. Wildlife managers, researchers and educators from the commission and the university take turns presenting the latest on wildlife research and related issues. Seminar topics this year included deer management, fisheries research, the state's hunting heritage, the importance of native plants to wildlife, land acquisition for conservation and a 30-year history of red-cockaded woodpecker management."

A PROPER SETTING

The building that is home to the Centennial Campus Center for Wildlife Education is the N.C. Wildlife Resources Commission Administrative Headquarters, an impressive five-story, 73,000-square-foot structure of red brick and glass. But don't let initial appearances fool you: It's green—"green" as in environmentally sound and eco-friendly. The state-of-the-art building is a pilot project in the state's High Performance Building Program, utilizing design elements that incorporate renewable and reusable resources and cause minimal local and global environmental impact.

Kids dunk their hands in ice-cold water during a Cold Can Kill workshop.

Throughout the six-year construction, sustainable and/or recycled building materials were used extensively. The 100-percent-recycled carpet tiles are a building-wide example. The building is oriented to best capture natural light, and white ceilings and suspended light shelves help reflect it. The interior space is equipped with occupancy sensors and automatic light dimmers to help conserve energy.

"Our building was designed to reflect the agency's commitment to conserving the state's natural resources," says Gordon Myers, deputy director of Operations and Technical Services. "It's an achievement we're proud of, certainly, but it's also a goal we want to share. Staff educators at the center incorporate the building into programs and use its innovative features as working examples in their message."

The building has received national recognition for its ranking in the Leadership in Energy and Environmental Design rating system, the benchmark for green building evaluation. It also garnered a prestigious local award, the 2006 Sir Walter Raleigh Award for Community Appearance, in the institutional category, from the Raleigh City Council for its environmentally compatible, low-impact construction and operation. The judges noted that the structure and grounds are an "embodiment of environmental responsibility."

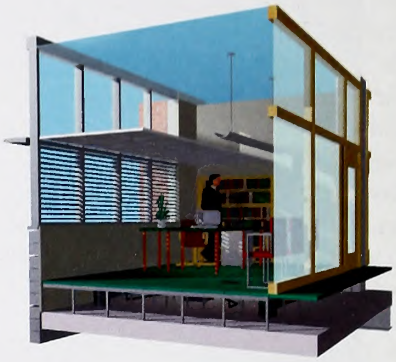
Another compliment came from a ranking source during dedication ceremonies on April 3, 2007. "I want to start by saying this is the most environmentally friendly and energy efficient building that we have to date," Gov. Mike Easley said. "It is only appropriate that a group in charge of conservation would be this progressive in their thinking about building and architectural design. As

"AT CENTENNIAL, WE CONCENTRATE ON CONSERVING WILDLIFE IN AN EXPANDING URBAN ENVIRONMENT. OUR EDUCATIONAL THEMES INCLUDE THE USE OF TECHNOLOGY IN WILDLIFE RESEARCH AND EDUCATION, URBAN WILDLIFE MANAGEMENT AND SUSTAINABLE LIVING."

– MARTI KANE

"OUR BUILDING WAS DESIGNED TO REFLECT THE AGENCY'S COMMITMENT TO CONSERVING THE STATE'S NATURAL RESOURCES."

– GORDON MYERS



THE BUILDING IS ORIENTED TO BEST CAPTURE NATURAL LIGHT, AND WHITE CEILINGS AND SUSPENDED LIGHT SHELVES HELP REFLECT IT. THE INTERIOR SPACE IS EQUIPPED WITH OCCUPANCY SENSORS AND AUTOMATIC LIGHT DIMMERS TO HELP CONSERVE ENERGY.

we celebrate this great building and, more importantly, what it stands for, keep in mind it shows what we can do together."

LEARN TO OBSERVE, LIVE TO CONSERVE

From the moment visitors enter the center lobby, they find engaging opportunities to stop and learn about what the region was once like, how things have changed and what the future could hold for the watersheds, vegetation and many species found in North Carolina's Piedmont.

Exhibits include:

• Wild Piedmont—Display shows various habitat types and the role ecological succession has played in their evolution.

• Piedmont Portraits—Floor-to-ceiling murals present classic Piedmont habitats, and a "habitat concert" with light and sound replicates each environment.

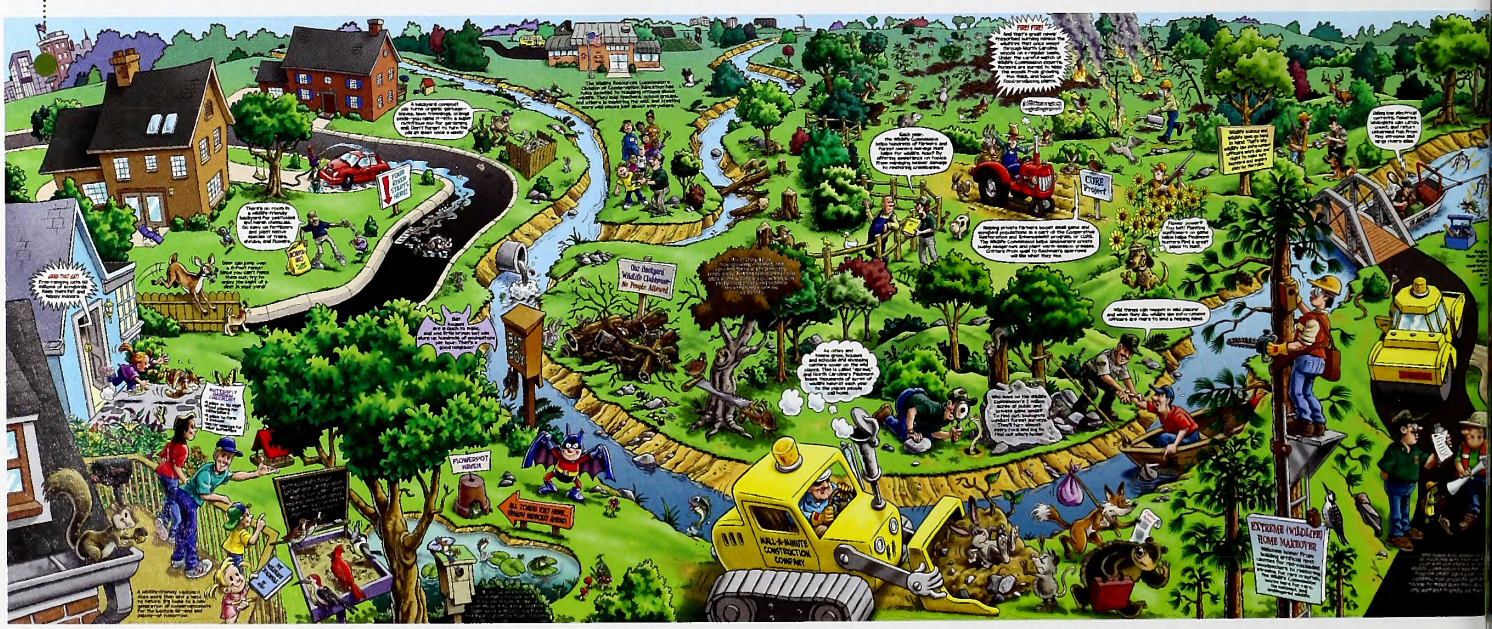
• Wetlands and Wild Lives—Touch-screen monitors give natural history information, range map and sounds of 100 Piedmont animals in the wild.

• North Creek and Centennial Campus Greenway Cams—High-magnification video lets visitors explore the grounds via zoom cameras.

• The Science of Nature—Interactive stations navigate computer-based story lines with topics including how scientists learn about wildlife and how they use their knowledge to benefit flora and fauna.

The short documentary "Piedmont Habitats" is shown at regular intervals in the auditorium. It conveys the immediacy

A mural by Jackie Pittman, on display at the center, illustrates the connected relationship between man and his surrounding environment. Visit www.ncwildlife.org to view the mural text. Kaleb and Mikaila Branscome (far right) learn about Piedmont mammals.



Educator Susannah Thompson is shown conducting a distance learning program (left). Stormwater ponds are just one part of the varied environment of the Center.

of man-made changes in the Piedmont, how a growing population alters animal and aquatic habitats, and the far-reaching consequences of human actions.

A HISTORY OF CONSERVATION

Since the Wildlife Commission was created by the General Assembly in 1947, the men and women of the agency have been dedicated to the conservation and management of fish and wildlife for the benefit of citizens and sportsmen, and for future generations. Policies and programs are based on scientifically sound resource management, assessment and monitoring, applied research, and public input.

A special exhibit represents these good stewards of natural resources who protect,

ILLUSTRATED BY JACKIE PITTMAN

educate, build and maintain. A rotating display alternates between highlights of the agency's six divisions:

- Wildlife Management—Maintains 2 million acres of game lands, strives for wildlife diversity through a Nongame and Endangered Wildlife Program and provides technical guidance to landowners.
- Inland Fisheries—Manages the state's freshwater fisheries and six fish hatcheries and does aquatic habitat research.
- Engineering—Although best known for construction duties and public boating access, it also maintains the Waterway Marking Program, with more than 1,200 buoys and navigational aids statewide.
- Administrative Services—Handles hunting and fishing licenses, boat registration and titling, and product sales.
- Law Enforcement—Provides round-the-clock services of wildlife enforcement officers, who actively enforce the state's fish, game and boating laws and conduct hunter safety education and safe recreational boating courses for the public.
- Conservation Education—Is responsible for the three wildlife education centers and publishes the monthly magazine, *Wildlife in North Carolina* magazine.

The commission's storied history and accomplishments are chronicled through a time line, thoroughly illustrated with historic and contemporary artwork and photographs. Special attention is given to the restoration of wild turkey and deer populations, the protection of endangered species and land acquisition.

PLAN A VISIT

The Centennial Campus Center for Wildlife Education is open Monday through Friday from 8:30 a.m. to 4:45 p.m., with regularly scheduled general public and organized group events. There's something for practically every age group and interest throughout the year, except on state holidays.

All three of the commission's centers have an impressive variety of programs. Admission and most activities are free. At the Centennial Campus Center for Wildlife Education, group programs are offered on-site or through distance learning. Teacher workshops are available on-site or as outreach initiatives.

Centennial Campus Center visitors will find a Wild Store, a one-stop source for wildlife-related gifts, T-shirts, books, games and other educational products. Upstairs on the second floor is the Customer Service Center, which provides boat registration and hunting and fishing licenses.

For more information on the Centennial Campus Center, call (919) 707-0209 or go online to www.ncwildlife.org. ◆

Geoff Cantrell is a public information officer with the N.C. Wildlife Resources Commission.

Ubiquitous & Nonexistent

Birders may observe numerous species of gulls in much of North Carolina, but they won't find any "seagulls."

Written by Jamie Cameron

Laughing Gulls

What I am about to write may come as a shock. It could shake the very foundation of the beliefs you hold dear. It could unravel the fabric of commerce. Brace yourself.

There's no such thing as a seagull.

"But what about all the picture postcards?" you say. "What about the Seagull motels and the Seagull restaurants? Don't tell me there aren't any seagulls. I've been in the gift shops; I've walked on the beach."

Nope. No such thing. The bird doesn't exist.

Herring Gull

Great Black-backed Gull

Bonaparte's Gull

Those gray-and-white birds of various shapes and sizes you saw at the beach last vacation have the same blood as the ubiquitous types you might see every day on the ride to work. You know the ones: those birds loafing in empty baseball fields, walking around with the cows, perched on rooftops in the middle of town or paddling around in the river.

Gulls are no more tied to the sea than a Yankee is to the north side of the Mason-Dixon Line. They're everywhere. (Trust me on this; I'm one of those Yankees.)

Nineteen species of the diverse family of birds known as gulls have been identified in North Carolina, although one—the slaty-backed gull—is listed by the Carolina Bird Club as accepted provisionally. With possible changes in taxonomy, and with gull watching booming in popularity among Tar Heel birders, even more species are likely to be found.

Taxonomy is how we categorize a species. The current trend in ornithology is to split known species into two or more new ones. DNA studies are proving that just because two birds look alike doesn't necessarily mean that they are the same species. Many almost identical but geographically distinct gull populations are now believed to comprise several different species.

North Carolina's familiar herring gull, the same herring gull that occurs all over the globe, is proving to be an excellent example of previously undetected speciation.

We have all seen herring gulls. They are perhaps the most common species of gull east of the Mississippi River. The herring gulls on the coast of Africa appear almost identical to the herring gulls standing around at the landfill outside Raleigh. The ones in Europe look pretty much the same, too.

But when scientists took the time to study and compare the DNA of birds from the different populations, it became obvious that looks can be deceiving. In recent years, taxonomists have concluded that there are, in fact, many types of herring gulls, some perhaps worthy of being classified as separate species. All of them are descendants of the same ancestor, but they have become distinct through the forces of geographic isolation and evolution.

To make matters even more complicated for budding gull aficionados, the larger species of gulls are notorious for hybridizing amongst themselves. Crossovers between species are relatively commonplace, creating mongrels

bearing physical traits from both parents that defy even the most serious gull watcher's attempts to identify them.

On any given day on the North Carolina coast, birders can venture out and, with a bit of luck, observe the world's largest species of gull. Great black-backed gulls are massive and formidable opportunists of bird society. At 30 inches in length, they are kings of the gull family, and all lesser species bow to their dominance or become quickly reminded of their place with a swift jab from the black-backed's powerful bill.

With a wingspan that reaches over 5 feet and that large and sturdy bill, these gulls often pirate scraps from their subordinates. They are regular visitors to garbage dumps, where they dine heartily on the edible refuse of humanity.

These largest of gulls require four years to acquire their adult plumage, a striking all-white head, breast and belly with a near-black back and wings. Younger birds sport varying amounts of brown and dark gray feathering, depending on their age.

Little gulls, on the other hand, are tiny, graceful creatures that flutter over the surface of the water, picking up small fish, shrimp and other organic morsels. No larger than the ever-present Forster's tern, these aptly named gulls are identified by their all-dark underwings. In summer, adults wear a black hood. In winter, when they are most likely to be seen in North Carolina, little gulls lose this helpful fieldmark.

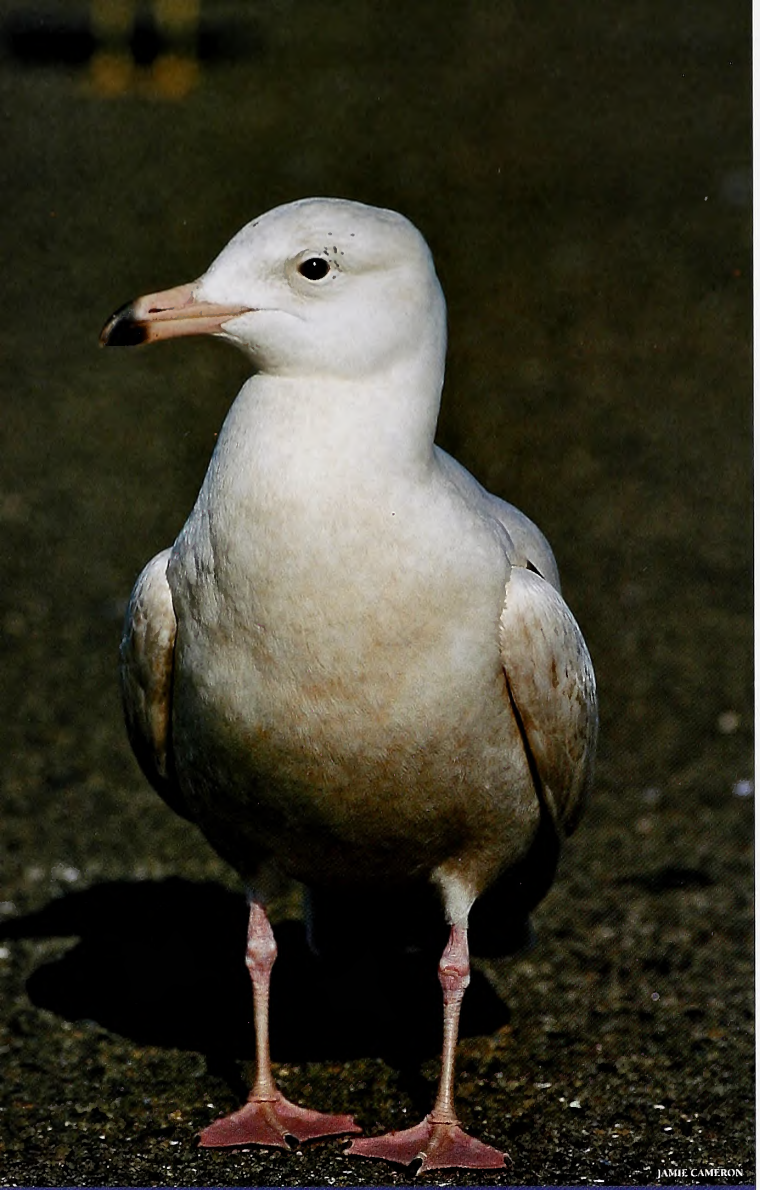
Bonaparte's gulls are a bit larger and far more common visitors than their little cousins. From late fall through early spring, these silver-winged beauties often concentrate in large numbers at coastal inlets and offshore rips, where they make shallow, headfirst dives in pursuit of edible bits of tidal flotsam. They are also found by inland birders on large natural and man-made lakes, especially in places where water is forced to flow at high rates. The large culverts that transfer water under N.C. 94 as it bisects Lake Mattamuskeet in Hyde County are excellent examples of freshwater Bonaparte's gull habitat.

Observers can identify Bonaparte's gulls from great distances by keying on the birds' diagnostic white triangular pattern on the upper forewings. It is among a large flock of Bonaparte's gulls that bird watchers stand

Gulls are no more tied to the sea than a Yankee is to the north side of the Mason-Dixon Line. They're everywhere.

MARK BUCKLER

Populations of great black-backed gulls (with Forster's tern) have increased.



JAMIE CAMERON

Glaucous Gull

MELISSA McGAW

Ring-billed Gull

MARK BUCKER

their best chance of spotting a little gull. Perhaps the most easily identified species of gull that visits North Carolina is the laughing gull. Although migratory in our region, laughing gulls nest in large numbers on the salt marsh islets of the Atlantic seaboard. During the spring and summer breeding season, laughing gulls are the most common species on the coast. The conspicuous black hoods and red bills of the adults and their raucously maniacal calls are integral parts of the memories of most summer beach days.

In winter, most laughing gulls depart for more temperate climes along the Gulf Coast and points farther south. They are replaced both in familiarity and commonality by ring-billed gulls.

Once they have been through their first winter, these medium-sized gulls develop a conspicuous dark band that wraps around the upper and lower mandibles—hence the name, ring-billed.

Lesser black-backed gulls, once considered to be rare vagrants in the United States, have steadily increased as winter visitors to North Carolina. Herring gull-sized, but slighter in frame, lesser black-backeds closely resemble their giant relatives the great black-backeds.

A few field trips with a skilled observer is all it takes to learn how to distinguish the lesser black-backeds from the great black-backed and herring gulls. Bird watchers visiting the Outer Banks beaches in winter, especially Cape Point, often tally as many as 100 lessers a day in the large, mixed congregations that roost there.

Cape Point is, in fact, one of the premier gull-watching locations in North Carolina, if not the entire Eastern seaboard. In addition to the previously mentioned species, diligent observers have found Iceland, glaucous, California, yellow-legged, Thayer's, black-headed, mew, Franklin's and black-tailed gulls at this location.

Far from the coast, gull watchers can still find plenty of opportunities to pit their identification skills against this challenging tribe. Kerr Reservoir and Lake Gaston along the North Carolina–Virginia border, Jordan and Falls lakes in the Raleigh-Durham area, and

Herring gulls (left) and laughing gulls (below) are two of 19 gull species in our state.

Lake Norman north of Charlotte host concentrations of gulls during the spring and fall migration periods and the winter.

For organizers of the fledgling Birding Trail (NCBT), the state's exceptional diversity in gulls is just another attraction for out-of-state birdwatchers, especially in winter. "Having so many species of gulls throughout the year in North Carolina is great for birders and the many businesses that birders patronize," said Salinda Daley, the N.C. Wildlife Resources Commission's NCBT coordinator.

Not all gull news is good news. Several of the larger species found in the state are experiencing a population boom thanks to the growing abundance of human-generated garbage. When they're not dining at the dump or the docks, herring and great black-backed gulls often look to the nests of other waterbirds for food. Tern colonies provide plenty of opportunities in the way of eggs and chicks for hungry gulls. When large gulls are around, nesting shorebirds such as American oystercatchers, Wilson's plovers and piping plovers have a hard time keeping their offspring safe.

Susan Cameron, waterbird biologist with the commission's Wildlife Diversity Program, said the long-term effects that large gulls will have on vulnerable beach-nesting species might be significant. "As herring and great black-backed gulls have expanded their traditional nesting territories in North Carolina, they have increased their influence on the breeding success of other beach-nesting species," she said.

Cameron said beachgoers can help lessen the negative impacts of large gulls by refraining from feeding them picnic and fishing scraps. That well-intentioned act alone can attract predatory gulls to breeding sites of other coastal species.

Whether you consider them underappreciated heroes or feathered villains, gulls are a diverse and fascinating group that deserves more attention. Give them a chance the next time you head out into the field.

Just please, don't call them seagulls.

Jamie Cameron is editor of a weekly newspaper and an amateur naturalist living in Stella.

JAMIE CAMERON

Lesser Black-backed Gull

JAMIE CAMERON

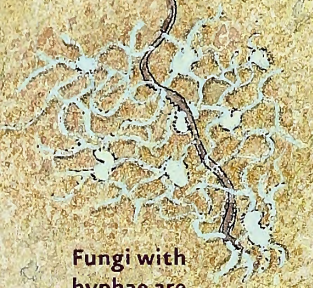
Iceland Gull

MARK BUCKLER

Consider the ground you stand on. You may not believe what's

Living in the Soil

written by Jeff Beane
illustrations and nature activity by Anne M. Runyon

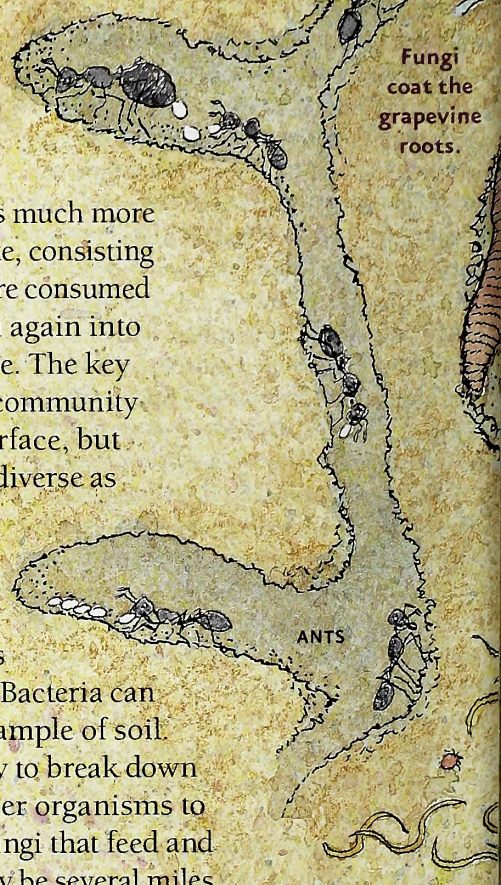


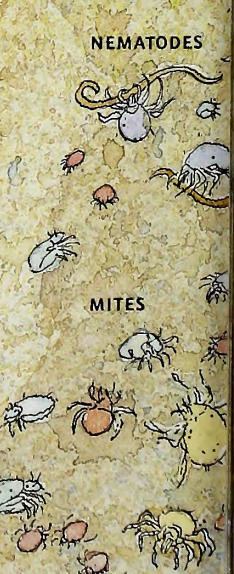
Fungi with hyphae are growing on the tree roots.

Bacteria are clustered on the fungal hyphae.

Cillate protozoans are common in loamy soils.

Flagellate protozoans are comman in clay soils.



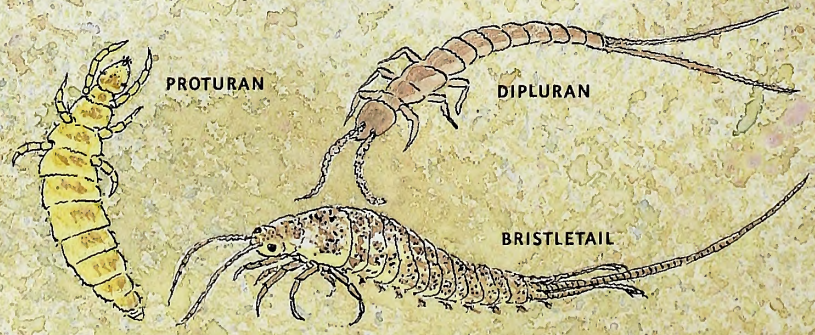


We take the soil beneath our feet for granted, but it's much more than dirt—it's a vast, constantly changing substrate, consisting of a mixture of organic and inorganic materials. Nutrients are consumed by plants and animals, which die and are broken down again into their organic and mineral components in an endless cycle. The key players in this process make up a richly varied, teeming community of living things. Most live within a few inches of the surface, but some venture deeper. Some soil communities may be as diverse as tropical rain forests.

DIRT DENIZENS

Among the most abundant and important soil organisms are "fundamental decomposers" like bacteria and fungi. Bacteria can make up 90 percent of all the living things in a given sample of soil. Fungi are important decomposers because of their ability to break down tough materials like cellulose and lignin, allowing other organisms to continue the process. Most soils are full of the parts of fungi that feed and grow—thin, spreading filaments called hyphae. There may be several miles of hyphae in a square foot of soil!

Protozoans—single-celled animals—are also abundant, usually feeding on bacteria. In wetter soils, algae are present, making their own food via photosynthesis. Mites—tiny arachnids related to spiders and ticks—abound, feeding on bacteria, fungi and other organisms.



A woodcock probes for an earthworm in its burrow.

Springtails eat the fungi on the grapevine roots. Mites eat the springtails.

MORE DIRT DENIZENS

Among the largest (and perhaps most underrated) decomposers are millipedes. A dead leaf doesn't lie around long before these many-legged soil makers begin to chew holes in it, breaking it down into pieces suitable for smaller creatures. Mollusks (like snails and slugs) and isopods (like pillbugs and sowbugs) are also among the larger, more visible players in this process. Without them, leaves and dead wood would pile up higher than our heads, and plants would be unable to absorb their nutrients.

A great variety of insects pitch in. Some are familiar, like ants, termites, wood roaches, earwigs and various beetles. Others are uncommon and poorly known, such as proturans, diplurans and bristletails. Among the most common of all soil insects are springtails, or collembolans—a group of rather primitive, soft-bodied insects that feed mostly on fungi and use a forked appendage called a furcula to spring away from predators. Less common but equally interesting soil animals include pauropods and symphylids (tiny, distant relatives of centipedes and millipedes), pseudoscorpions (harmless arachnids resembling tiny scorpions) and tardigrades (a phylum of bizarre little animals resembling tiny bears).

WONDER-WORKING WORMS

In some tropical regions, the primary soil movers and shakers may be termites, ants, millipedes or other arthropods, but in many temperate zones, it's worms. Of all soil builders, earthworms are among the most remarkable. Far from mere fish bait or robin fare, they are literally topsoil factories, constantly eating, excreting, moving and aerating soil. Scientists have long marveled at the volume and efficiency of their work. Aristotle called them "the intestines of the earth." Darwin wrote: "It may be doubted whether there are many other animals which have played so important a part in the history of the world as these . . . creatures." In some regions, it's likely that all visible soil has passed through an earthworm at least once. Pot worms (also called white worms or enchytraeids)—a family of small, whitish worms closely related to earthworms—are also abundant in some soils.

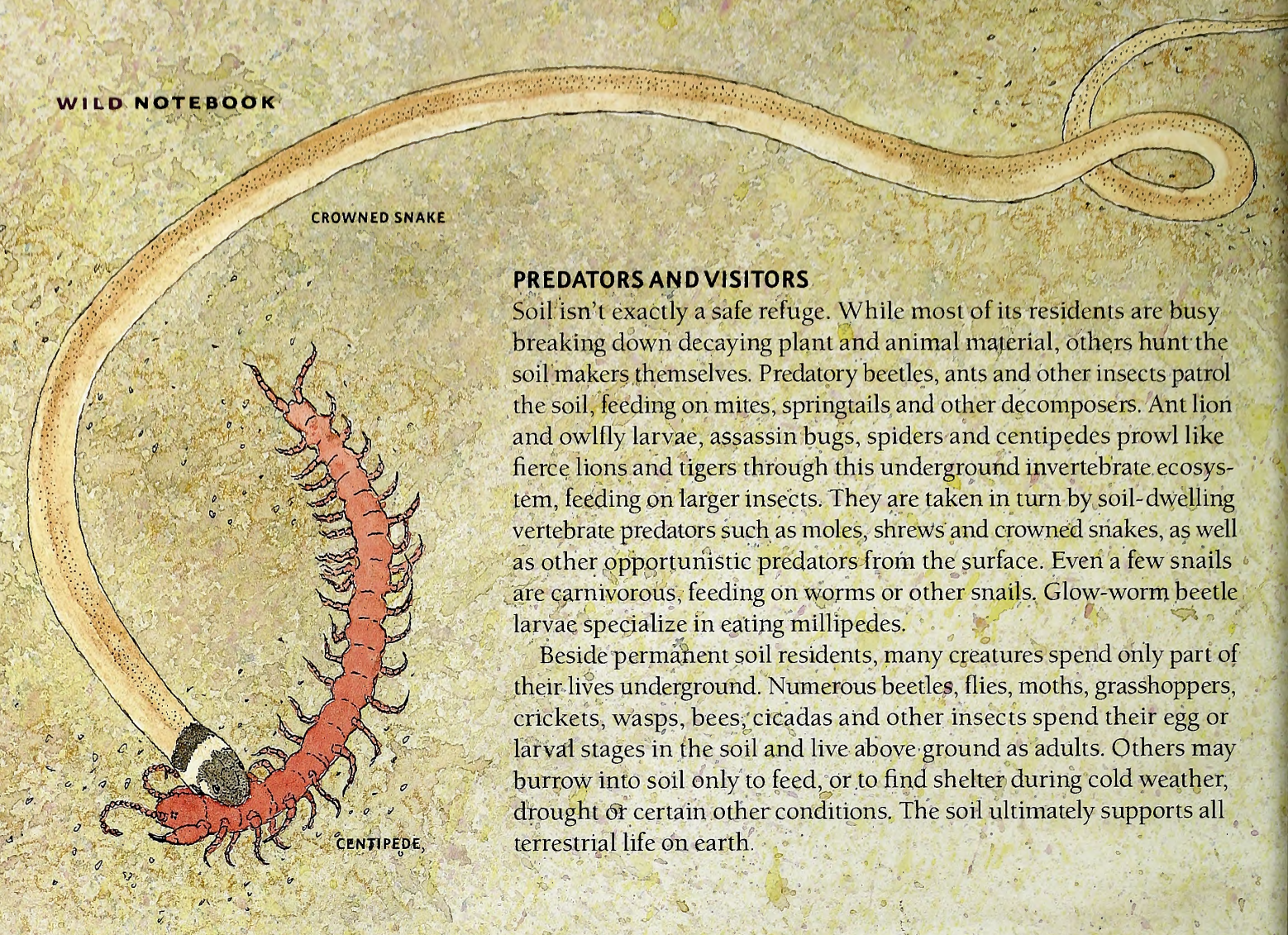
Among the most abundant of all soil animals are yet another group of worms—nematodes, or roundworms. Some species are parasitic, spending their lives inside other animals, but many are free-living in soil, feeding on plant roots, fungi and small animals. A spadeful of rich garden or woodland soil can contain thousands, or even millions, of nematodes!

PAUROPOD

SYMPHALA

TARDIGRADE

PSEUDOSCORPION



PREDATORS AND VISITORS

Soil isn't exactly a safe refuge. While most of its residents are busy breaking down decaying plant and animal material, others hunt the soil makers themselves. Predatory beetles, ants and other insects patrol the soil, feeding on mites, springtails and other decomposers. Ant lion and owlfly larvae, assassin bugs, spiders and centipedes prowl like fierce lions and tigers through this underground invertebrate ecosystem, feeding on larger insects. They are taken in turn by soil-dwelling vertebrate predators such as moles, shrews and crowned snakes, as well as other opportunistic predators from the surface. Even a few snails are carnivorous, feeding on worms or other snails. Glow-worm beetle larvae specialize in eating millipedes.

Beside permanent soil residents, many creatures spend only part of their lives underground. Numerous beetles, flies, moths, grasshoppers, crickets, wasps, bees, cicadas and other insects spend their egg or larval stages in the soil and live above ground as adults. Others may burrow into soil only to feed, or to find shelter during cold weather, drought or certain other conditions. The soil ultimately supports all terrestrial life on earth.

Get Outside

Finding soil invertebrates is easy, no matter where you live. Just scoop up a spadeful or handful of soil, spread it out on a clean, light-colored surface in good light and watch what emerges. You won't be able to see the tiniest organisms—such as bacteria or protozoans—without a powerful microscope, but chances are there will be arthropods and worms that you can see. Use a scope if you have access to one; if you don't, try to find at least a hand magnifying lens. Would you expect to find more animals in a sandbox or a compost pile? In a gravel parking lot or a hardwood forest? Rich woodland soils usually host the greatest diversity, but even the most barren-looking patch of dirt is a living community.

Scientists who sample soil invertebrates use a simple device called a Berlese funnel. You can make one from an ordinary funnel (or a plastic milk jug or drink bottle with the bottom cut out). Place the funnel in a jar, flask or other container to catch the invertebrates (if you want to preserve, identify and count them, you can put ordinary rubbing alcohol in the bottom of the jar to preserve them). Cutting a piece of screen or hardware cloth to fit into the funnel will help prevent soil and litter from spilling through, but still allow soil animals to escape. Place soil or surface litter in the funnel and set it under a lamp (an ordinary 40- or 60-watt bulb will do). Soil organisms will retreat downward to flee the light and heat from the bulb and fall out the bottom of the funnel and into the container. How many different kinds of soil animals can you identify?

Read and Find Out

- "Rolypolyology" by Michael Elsohn Ross, Carolrhoda Books, 1996.
- "Ecology of Soil Animals" by J. A. Wallwork, McGraw-Hill, 1970.
- "Biology of Earthworms, 2nd Edition" by C. A. Edwards and J. R. Lofty, Chapman and Hall, 1977.
- "Ecological Interactions in Soil" by A. H. Fitter, editor, Blackwell Scientific Publications, 1985.

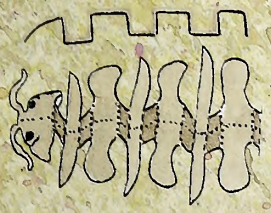
In *Wildlife in North Carolina:*

- "Wonderful Worms" by Lawrence S. Earley, April 1981.
- "The Soil Makers" by Lawrence S. Earley, October, 1984.
- "The Nutrient Chase" by Lawrence S. Earley, February 1988.
- "Building a Compost Pile" by Lawrence S. Earley, April 1990.
- "Partners for Life" by Lawrence S. Earley, March 1996.
- "Life in the Basement" by Jeff Beane, February 1999.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Roly-Poly Paper Sculpture

1) Cut out your roly-poly's box.
2) Fold roly-poly in half along the · · · line.
3) Cut out roly-poly along black lines and unfold. Flatten roly-poly.
4) Fold down along · · · line and up along the - - - lines near eyes. Glue A to B. This makes head rounded.
5) Fold all body and leg segments up and down like this.



6) Turn roly-poly on back and tape each leg segment to the body segment behind it. Use a tiny piece of tape.
7) Pick up roly-poly and gently fold each body segment, over-lapping the one behind. Start with head.
8) Finally, gently roll the sides of your roly-poly down over your finger, or over the edge of your hand. This gives the roly-poly a curved shape. You can also curl it into a ball, like a real roly-poly that is hiding.

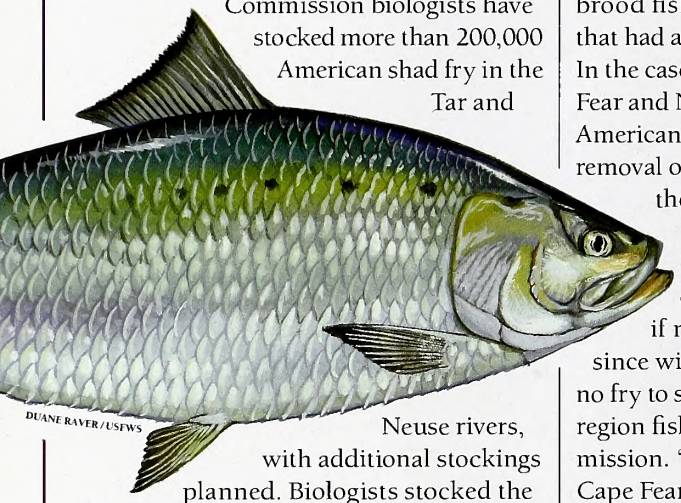
©Anne Marshall Runyon

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

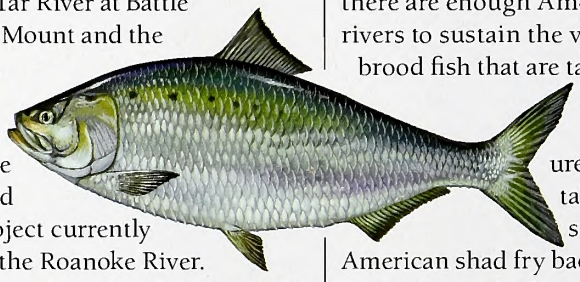
Stockings Bolster Tar, Neuse Shad Populations

The little fish being dumped by the thousands into the Tar and Neuse rivers aren't even an inch long yet, but in three or four years, when they have matured into 2- to 3-pound American shad adults, they will migrate back upriver and help supplement an important recreational sport fishery.

So far, N.C. Wildlife Resources Commission biologists have stocked more than 200,000 American shad fry in the Tar and Neuse rivers, with additional stockings planned. Biologists stocked the fry in the Tar River at Battle Park in Rocky Mount and the Neuse River at Goldsboro to replace brood fish used for the American shad restoration project currently under way on the Roanoke River.



DUANE RAVER/USFWS



The fry were hatched and grown at the commission's Watha State Fish Hatchery and the U.S. Fish and Wildlife Service's fish hatchery in Edenton. Raising fry in a hatchery environment greatly increases their survival to adulthood, since it gets them past a critical stage of early life development.

American shad, once an important commercial and recreational fishery in North Carolina, have severely declined in the Roanoke River. To help rebuild populations, commission biologists, along with other state and federal agencies, began a shad restoration effort in 1998 and have stocked more than 13 million shad fry in the Roanoke River.

Following protocols of other states involved in American shad restoration efforts, commission biologists collected brood fish for fry production from rivers that had adequate stocks of American shad. In the case of North Carolina, the Tar, Cape Fear and Neuse rivers had good numbers of American shad that could easily sustain the removal of a few brood fish without hurting the populations.

"Collecting brood fish for fry production is a critical element of our shad restoration program, if not the most critical element since without brood fish there would be no fry to stock," said Pete Kornegay, coastal region fisheries supervisor with the commission. "Extensive sampling in the Tar, Cape Fear and Neuse rivers has shown that there are enough American shad in these rivers to sustain the very few numbers of brood fish that are taken for this important restoration effort.

"As an added measure of protection, we're taking the extra step of stocking more American shad fry back into these rivers."

American shad historically have been an important commercial catch also. However, commercial shad landings in North Carolina declined in 2006 for the third straight year. The 184,965 pounds of American shad caught was worth $201,026 to fishermen. The commercial season runs from Jan. 1–April 14. From April 15 to the end of each year, American shad may be taken only by hook and line. The recreational catch of the fish is unknown. There are no recreational size restrictions for American shad, but there is a daily creel limit of 10 fish in the aggregate of American shad and hickory shad.

Under the Atlantic States Marine Fisheries Commission's fishery management plan, a five-year phase-out of the ocean intercept fishery for American shad began on Jan. 1, 2000. The ocean intercept fishery closed completely on Jan. 1, 2005.

ON PATROL

Sgt. Brian Blankenship received a report that a man was hunting deer with a rifle from a camper near the Virginia state line during the bow and arrow season. After checking a couple of times throughout deer season, the officer finally spotted the suspect. Blankenship watched as the man observed his deer feeder from an open window in his camper.

After watching the suspect for some time, Blankenship approached the man and asked if he could come inside. Upon being permitted to enter, the officer noticed the man had a .30-06 rifle. Blankenship asked him if he was hunting deer out of season. The suspect replied, "No. I'm trying to kill this bear that's been tearing up my deer feeder." The man was charged with hunting bear during the closed season and hunting bear over bait.

ILLUSTRATED BY JACKIE PITTMAN

Commission Receives Grants for Land Conservation

Thanks to a series of monetary grants from the N.C. Natural Heritage Trust Fund, the N.C. Wildlife Resources Commission has secured funding to purchase more than 3,000 acres of sensitive natural habitat, much of it formerly owned by International Paper.

Fund trustees voted in late April to give the commission more than $4.7 million in grants. The commission will use that money to buy five properties that will be added to the public game lands system in the near future.

"Trustees of the Natural Heritage Trust Fund continue to demonstrate long-term support of the commission's land acquisition efforts," said David Cobb, the division chief of Wildlife Management. "Without support of the trustees for making sure these high-quality tracts are in a perpetual conservation ownership, many of them would be developed or otherwise converted."

The funding continues a process that began in April 2006, when International Paper sold more than 65,000 acres of North Carolina land to The Nature Conservancy, which in turn agreed to sell much of the acreage to state conservation agencies such as the Wildlife Commission.

The properties consist of high-quality habitat upland and bottomland forests, as well as floodplains and wetlands, making them valuable for water quality protection and wildlife habitats. Some tracts also contain rare and endangered plants and animals.

The Trust Fund's allocation of $1.77 million for several tracts in Warren and Franklin counties will allow the commission to purchase more than 1,100 combined acres of land along the Tar River's tributaries. Many of these creeks have very high water quality for the Piedmont, and several harbor rare and endangered species of freshwater mussels.

KEN TAYLOR/NCWRC

Another property to be acquired through the Trust Fund is Jessup Mill Pond in Cumberland County, which will enlarge Sugg's Mill Pond Game Land by more than 700 acres. Jessup's is a scenic body of water that offers great fishing and recreational opportunities among its standing cypress trees, all within easy access of the Fayetteville area.

Grant requests for the acquisition of lands in Brunswick County near Green Swamp (approximately 1,000 acres), Roquist Pocosin (more than 300 acres) in Bertie County and the Roanoke River (roughly 90 acres) were also funded.

The commission will continue to pursue International Paper lands, utilizing money from its own budget as well as other grant opportunities. The North Carolina properties were part of a massive sale by the paper company last year, which transferred ownership of more than 218,000 acres in 10 southeastern states.

More Boat Ramps ... Please!

When it comes to public boat ramps built and maintained by the N.C. Wildlife Resources Commission, there's no question demand exceeds supply. That's the basic finding of the commission's recent study that focused on boating access. The "Boating Access Survey" received input from a total of 3,783 North Carolina residents, with particular attention paid to 20 coastal counties.

The report showed that roughly seven out of 10 respondents use commission boat ramps. Of that group, ease of use, convenient location and fishing opportunities near access points were cited as primary determining factors. However, a significant portion of those respondents cited crowding, limited parking and lack of public restrooms as major factors that should be addressed in an effort to improve commission-run boat ramps.

"If I don't get to the ramp before 6 a.m. on a weekend, boating becomes too hard to bother," said one survey participant. "I probably skipped 10-plus trips this year because it is just too crowded."

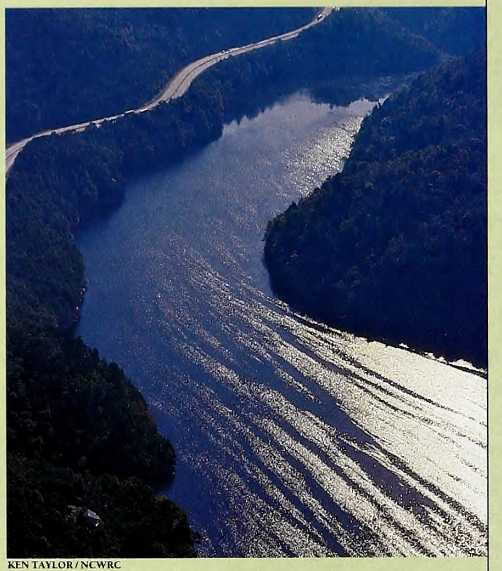
Nowhere were these issues more prevalent than in coastal counties, where rapid shoreline development is making water access tougher to find. One out of three respondents in coastal counties said they'd lost access to a boat ramp in the last five years. Overall, roughly seven out of 10 respondents said they'd like to see more public boat ramps.

It's clear that boating is a popular pastime in North Carolina. On average, survey participants said they use their boats 58 days per year. The most common reasons for hitting the water were recreation (73 percent), saltwater fishing (53 percent), inland fishing (51 percent) and hunting (15 percent).

The commission is constantly searching for ways to improve user experience at any of the more than 200 state-owned boat ramps in North Carolina and thanks all of the boaters who contributed their ideas and opinions. For more information on the boat ramp study, or to see the survey results, visit the commission's Web site at www.ncwildlife.org.

Final Advisory for Waterville Fish Lifted

The long-running cleanup of the Pigeon River ("Pigeon River Revival," Dec. 2004) took another step forward this spring when State Health Director Leah Devlin announced the removal of the last remaining fish consumption advisory below the Blue Ridge paper mill in Haywood County. The final advisory, for Waterville Reservoir, had warned against eating carp from the lake because of elevated levels of dioxin,



KEN TAYLOR/NCWRC

Waterville Reservoir was impounded for power generation.

which is a byproduct of chlorine bleaching in the paper process.

"This is both a public health and an environmental success story," Devlin said. "It is a good example of an industry addressing a potential public health problem by changing its processes. I'm pleased we can close the book on this one."

The original advisory was issued by the state health director in 1988. It warned against consumption of any fish from below the then-Champion International paper mill because of high levels of dioxin found in fish. In 1994, that advisory was reduced to cover only carp and catfish. In 2001, it was reduced still further to just a limited advisory on carp in Waterville Lake, which originally was impounded for hydroelectric power generation.

Studies have shown that exposure to dioxin increases the risk of several types of cancer in animals and humans. The most common health effect in people exposed to large amounts of dioxins is chloracne, which is a severe skin disease characterized by large, deep, acne-like lesions. Some other effects include liver damage and changes in hormonal levels.

Improved pollution controls at the Canton paper mill were enacted during the late 1980s. The Champion mill was purchased by employees and renamed Blue Ridge Paper Products Inc. in 1999.

"Blue Ridge has operated in complete good faith," said Steve Fraley, the N.C. Wildlife Resources Commission's Western Aquatic Wildlife Diversity Coordinator. "They have invested all they were required to and more, and have complied with the scheduled step-down [in pollutant release] just as the [N.C.] Division of Water Quality and EPA [Environmental Protection Agency] have required."

Discharges from the paper mill turned the Pigeon the color of coffee and killed most species, including all native mussels and snails. Downstream from the mill, the fish community was dominated by such pollution-tolerant species as gizzard shad, common carp and goldfish.

After the EPA intervened in the early 1980s and established a timetable for cleaning up the discharge, the river slowly started to recover. Biologists in Tennessee began reintroducing native species of snails to the Pigeon in the mid-1990s, followed by mussels in 2000 and native fishes in 2001.

Since 2004 Fraley has been reintroducing native fish species, such as the mirror shiner and gilt darter, into the river in North Carolina. Game fish populations, primarily smallmouth bass and walleye, have improved tremendously in the Tennessee section. Bass populations are also improving in the river upstream from Waterville Lake in North Carolina.

Another problem that remains for the Pigeon River—and in many areas of the Mountain Region—is nonpoint source pollution from poorly managed construction, forestry and agriculture projects.

"Haywood County is developing rapidly," Fraley said. "There have been a lot of changes in the past 10 years, and new construction has really shifted into high gear over the past five years. We're seeing more effects from nonpoint source impacts."

CALENDAR OF EVENTS

Saturday, July 7

Check out the annual Coon Dog Day in Saluda. Festival begins at 7 a.m., contests and judging for dogs starting at 1 p.m. at Saluda Elementary School. Visit www.saluda.com or call (828) 749-2581.

Saturday, July 28

Learn about boats and boat-building at the Wooden Boat Festival at Cape Fear Community College in Wilmington. The event will feature more than 50 boats of various sizes. Contact (910) 362-7151 or visit http://cfcc.edu/news/stories/boatfest/boatfest.htm.

Saturday, August 4

Get involved in fly-fishing at the Beyond BOW Fly-Fishing Experience at the Pisgah Center for Wildlife Education. Women ages 18 and older may sign up for the event. Fee is $40. Activities include stream ecology, knots, fly-tying, fish handling and casting. Contact BB Gillen at (919) 707-0172.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

IN SEASON

This month, this season is open in North Carolina:

Crow: Season runs to Feb. 29, 2008.

Check the *2007–2008 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limit and applicable maps or visit www.ncwildlife.org.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
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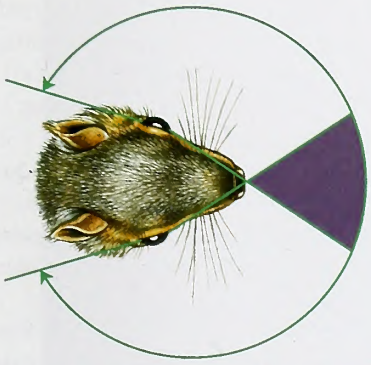
How Do Squirrels See So Well?

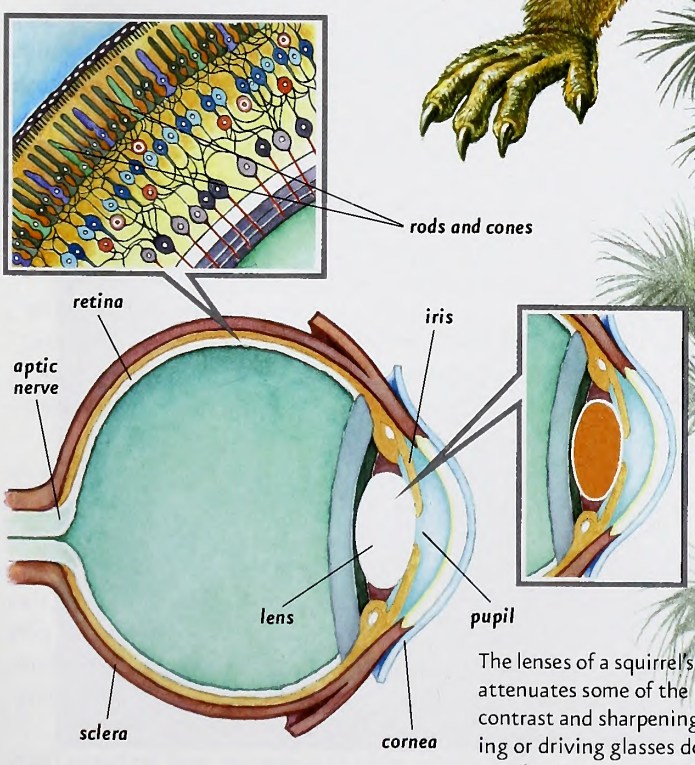
written by Clyde Sorenson
illustrated by Jim Brown

GRAY AND FOX SQUIRRELS can make long leaps between thin tree branches with remarkable accuracy. Several adaptations give them the superb eyesight they need for these acrobatic feats.



A squirrel's eyes are positioned on the animal's head in such a way to give it the excellent binocular vision it needs to judge distances, while at the same time providing wide-angle vision for predator detection.

Like many diurnal mammals, squirrels can see some color, although they don't see color as we do. The two kinds of color-detecting cone cells they have (we have three kinds) give them good vision in the green through blue range, but they don't see red well. Rod cells give them good vision in the low-light conditions of dawn and dusk.



The lenses of a squirrel's eyes are tinted amber by transparent pigments. This attenuates some of the light at the blue end of the spectrum, heightening contrast and sharpening the image the squirrel sees, much as amber shooting or driving glasses do for us. The pigment may also serve like built-in sunglasses to protect the squirrel's eyes from damage by the ultraviolet radiation in strong sunlight.

Bass, Alas

written by Jim Dean

Largemouth bass are the most popular freshwater game fish in the country, followed by walleyes and crappies. Several factors have given largemouths the edge. Since World War II, the nation has been on a lake-building spree that has only recently slackened (the best sites having already been dammed), and the highly adaptable largemouth bass has been stocked in most of them, vastly extending its original native range. Walleyes and crappies have also been introduced into many new waters, but their popularity remains more regional.

JIM DEAN

Blanton Saunders poling Currituck Sound in 1969.

Ironically, competition helped push the largemouth to the front of the pack. When bass tournaments were first gaining popularity, many recreational anglers detested the commercial exploitation of their favorite fish and predicted disaster. But then an unexpected thing happened. Tournament fishermen recognized the danger and adopted a catch-and-release rule (an ethic first championed by trout fishermen).

"Your beloved bass has only recently had the decency to plant shrubbery to hide the wheels on his family's rented single-wide."

Like their NASCAR driving counterparts, tournament fishermen became famous role models, and the policy of turning bass loose has become a near universal practice even on waters that never host pro tourneys. Not only are largemouth bass populations booming, they have spawned superb modern tackle and boats that are marvels of comfort and efficiency.

Even so, many fishermen have little respect for largemouth bass, and only slightly more for smallmouths. Largemouths, alas, are still stereotyped by their Southern roots.

"Your beloved bass has only recently had the decency to plant shrubbery to hide the wheels on his family's rented single-wide," one friend kidded me. "You know you're having affairs with trailer trash, don't you?"

Well, yes, I am, any time they'll let me. But permit me to note that while bass may be plentiful, they are seldom easy. Trout fishermen (especially those with limited bass fishing experience) may scream foul to hear this, but skilled anglers are more likely to get skunked fishing for bass than they are when stalking notoriously selective brown and rainbow trout. And while the traditions of trout fishing are well known and celebrated, bass fishing's distinguished heritage is all but forgotten. The dry fly is older, but bass are the father-fish of modern topwater plugging and bugging for all species. These tactics originated for bass more than a century ago and were enhanced by such angling icons as Alexander Henshall, James Heddon, Will Dilg, Ernest Peckinpaugh and Ray Bergman.

The kind of bass fishing these gentlemen enjoyed predates big impoundments and tournament fishing, but it still exists on smaller waters where stubborn traditionalists cling to Isaak Walton's conceit that angling is a contemplative sport.

I've had a lot of fun fishing the big impoundments with high-tech gear in high-tech boats, but I'd rather be on a farm pond in an old johnboat using bait-casting tackle and a Hula Popper, or a fly rod and a deer-hair bass bug similar to Henshall's original.

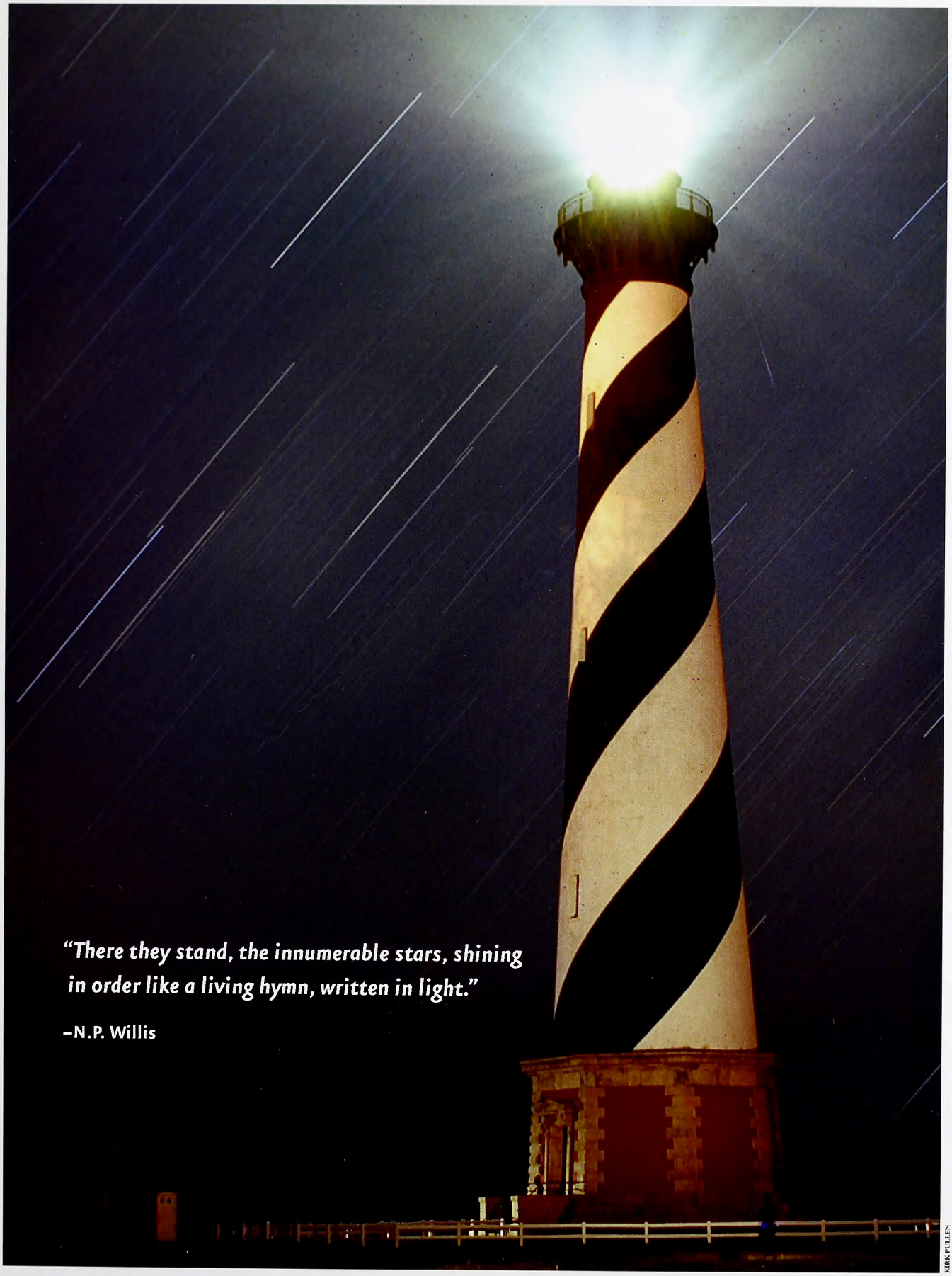
It's easy to trace this affection. My earliest bass fishing took place on an old millpond called Bluegill Lake near Littleton where I began fishing with my grandfather when I was 8 years old. He fished with glass-eyed wooden plugs using a decrepit Heddon bamboo casting rod and Pflueger Supreme reel. He also fished with cork bugs using his glass H-I rod and South Bend Oreno reel. I caught my first bass using his borrowed tackle.

All my fondest bass fishing memories occur on similar waters. Grandfather and his friends had a cabin built over the water on the Little Alligator River 3 miles out of Fort Landing in a place locals called the Goose Pond. We spent weeks there every summer.

We also made forays to fish the Chowan and Cashie rivers, but one of our favorite spots was Williams' Pond near Gatesville (now called Merchants Millpond), a large sprawl of dancing black water choked with cypress shrouded in Spanish moss. The bass fishing in all these places could be supremely frustrating, but few man-made impoundments match their wild charm. Small wonder that most of my current favorite bass spots—particularly Mattamuskeet and Phelps lakes—share the ambience of these natural backwaters.

But if I could go back to the late 1960s for one more glorious day on Currituck Sound at the peak of its bass heyday, Gabriel could toot his horn at twilight. I'd want the wind to blow strong out of the south for three days in late May and fall calm overnight, leaving the marshes flooded. Then, Blanton Saunders would pole me along in his juniper skiff while I stood in the bow with Grandpa's old H-I, dropping a big Marsh Hare bass bug just at the edges of the grass.

That was as good as it ever got, and far better than any of us deserve.



KIRK PULLEN

OUTDOOR MOMENT

Cape Hatteras Lighthouse

IN THE AUGUST ISSUE

NATE BACHELER

TAG, YOU'RE IT

A quarter century of red drum tagging has revealed consistent migration and spawning patterns by the big saltwater game fish.

A HEART FOR HUNTING

Dragging a deer without preparing for it is like running a marathon with no training. Before you hunt, make sure your heart is ready.

EXTRA MAYO, PLEASE

Whitewater paddling, fishing, hiking and scenic bluffs—the new Mayo River State Park offers a variety of good times outdoors.

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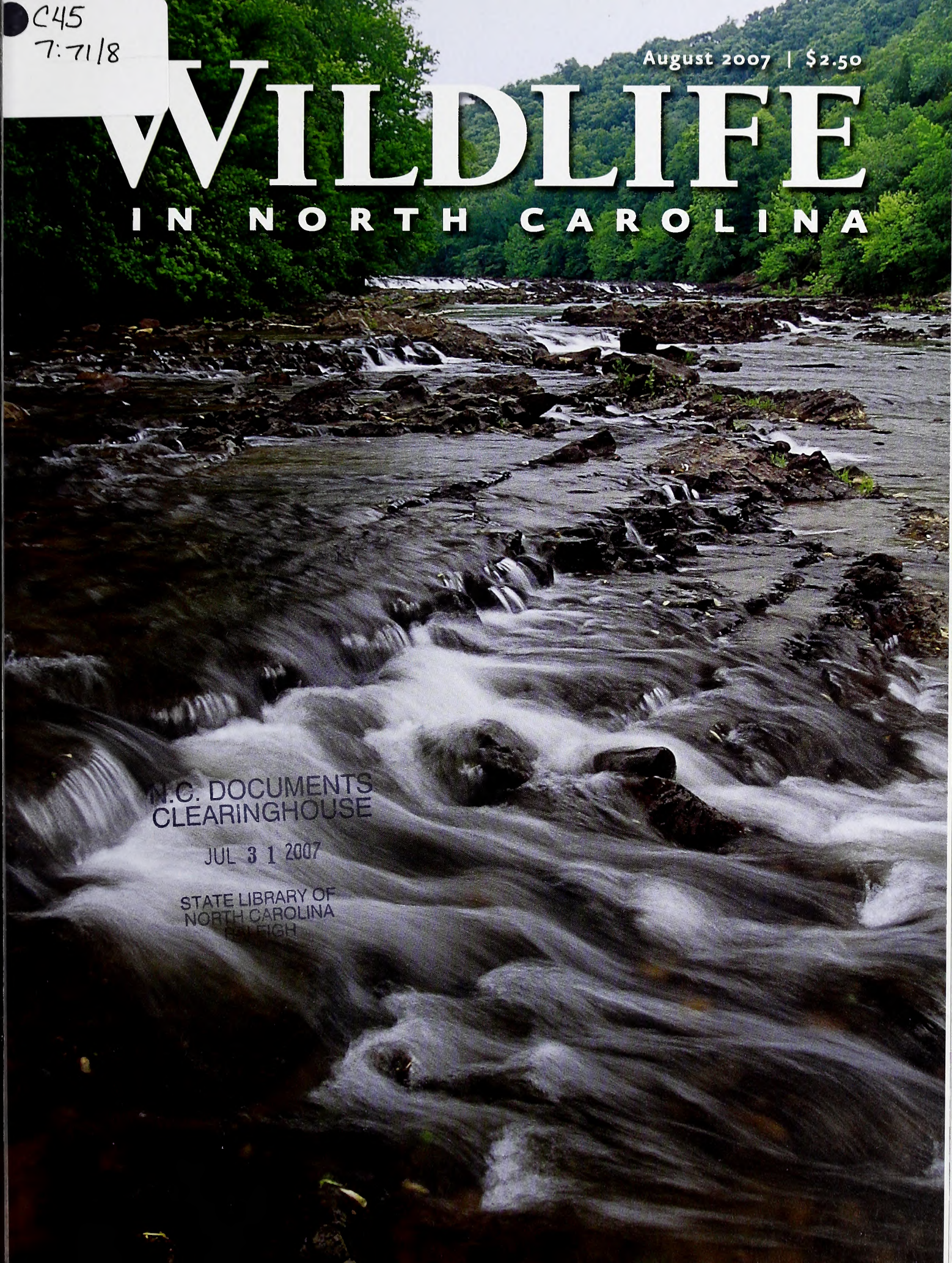

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The sharpnose shark is the most abundant shark in North Carolina waters during summer. The 3- to 4-foot creature is commonly seen off beaches and caught by anglers.
PHOTOGRAPH BY TODD PUSSER.

Volume 71 | Number 8

WILDLIFE IN NORTH CAROLINA

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Cover: Tucked in the northwest corner of Rockingham County, the Mayo River is a hidden, but not remote, gem for outdoors enthusiasts. PHOTOGRAPH BY MELISSA MCGAW.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

What is it about sharks? Few other creatures, and certainly no other marine animals, have the same savage appeal to people. Although sharks have existed for millions of years, they did not become cultural icons until "Jaws" debuted in 1975, enthralling and terrifying the entire country. Since then, dozens of other films such as "Open Water" and "Deep Blue Sea" have used sharks as the villain. Only cartoon series like "Jabberjaw" or "Kenny the Shark" dared to cast the shark as a hero.

TODD PUSSER

There's something visceral about sharks that signals, even to land-based animals, that these sleek sea creatures are dangerous but still very cool. They're the gunslingers of the ocean: Most sharks travel solo, attack with deadly speed, and possess the roguish charm of a Clint Eastwood character in a Western. Even though sharks kill, you know that, like the High Plains Drifter, they do it because that's what they were born to do.

How fascinating are sharks? Every summer, The Discovery Channel features "Shark Week," six days in which it runs dozens of documentaries on these megapredators. The channel gets its highest ratings of the year during this week. No wonder Discovery has done it for two decades.

Even small children understand the primal appeal of sharks. My 3-year-old son, Jack, is crazy about them. When we visited the N.C. Aquarium in Pine Knoll Shores last summer, he ran back and forth in front of the huge tank that includes several species of sharks, repeatedly shouting, "Great big sharks!" Rarely have I witnessed such unadulterated bliss.

The director of that aquarium, Jay Barnes, has written "The Sharks of Summer" (page 22) for this issue. In his story, he gives a good overview of the most common species of sharks found off the coast of our state. Barnes even addresses the subject of shark attacks in North Carolina. The good news is that your chances of getting hit by lightning are 30 times greater than being attacked by a shark. Just avoid watching "Jaws" before swimming...

Greg Jenkins

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River Reverie

The June issue with articles regarding canoeing ("Canoe Camping on the Cheap") and the Tar River ("Coordinating Conservation on the Tar") brought back memories. Back when Jim Dean was in early grammar school in Roanoke Rapids, I was in Boy Scout Troop 142. My best friend, Warren Wayne, and I were at a scout camp where the counselors considered organizing canoe trips down the Tar. Warren and I were chosen to scout the route. With peanut butter sandwiches in hand, we launched early that morning. The idea was to retrieve us at the dam in Rocky Mount that afternoon about 3 p.m.

What a memorable trip it was! We turned the canoe over just once, leaving wet peanut butter sandwiches. Rounding a bend, I smelled a sweet odor drifting over the water. I told Warren to paddle quickly and quietly — we had come upon an operating moonshine still.

Around mid-afternoon we began wondering how close to Rocky Mount we were. We pulled the canoe up under a bridge and walked down the road until we found an old store. We asked how far it was to Rocky Mount. After a couple of the old geezers stopped laughing, they told us we were at least 15 miles away. It was about 3 p.m. then. Being the good old boys they were, they took us to Rocky Mount, where we found the counselors. The proposed trips never materialized. I just wish I could do it all over again.

Bill Speight
Hope Mills

Heaven in Hip Boots

I really enjoyed reading Jim Dean's "Fly-Fishing's Recent Past" (June 2007). I grew up in Greensboro and fished the streams around Blowing Rock in the late 1950s and early '60s with my father and grandfather. We used fly rods but mostly bait-fished. I started using popping bugs in the ponds around Greensboro and became pretty fair. Catching bream, shellcrackers and bass also honed my skills with a fly rod.

In the mid '60s I began to fly-fish for trout in the mountains. Back then the opening day was the first Saturday in April and was usually pretty cold. My dad never owned a pair of hip boots or waders in his life, and I remember his look of disgust when I bought my first rubber hip boots from Sears.

I also remember thinking I had died and gone to heaven when I got a 7-foot Fenwick Ferrule-lite fiberglass rod. It was sweet and still is, though I haven't used it in years. It's fun to look at all the old stuff and think about all of the changes. It must be an unwritten rule that fly-fishermen never throw anything away, and that might be a good thing! Things have changed but the fishing is better than ever.

Charlie Vance
Dillon, S.C.

Duck that Chuck

Jeff Beane's great article on nightjars ("For the Love of Goatsuckers," June 2007) reminded me of a thrill I had one evening about 15 years ago. At the time we were living in Wilmington in a large development. There was a colony of chuck-will's-widows hanging on in spite of massive clearing. Fortunately, the lot next to ours had not been cleared. There were one or two of the birds on this lot and they would call to, and be answered by, others nearby.

I would imitate this call to see if I could get a response. I must have gotten pretty good. One evening a juvenile, probably male, perhaps fearing I was competition, swooped up my driveway preparing to go to war. Imagine the surprise for both of us as we realized our mutual error. I continued to "chuck," hoping to encourage the beautiful sound and its reassuring annual recurrence. Thanks for reviving some great memories.

Joan Partrick
Fairfield, Va.

Bald-Faced Tale

I found T. Edward Nickens' poetic account of his bald-faced hornets engrossing ("The Empty Nest," May 2007). It took me back to my own adventure last summer with a hornets' nest in my azaleas. It quickly grew larger than a basketball, and I watched the burgeoning growth with fascination. Finally, after being chastised by all who came to my house and by my young man who mows for me about the liability I risked, I decided to go, after dark while "everybody" was at home and kill the hornets, saving the enormous nest as a souvenir and conversation piece.

I went down the hill with 25-foot wasp spray and flashlight. I sprayed and sprayed, especially into the entrance hole, then went back up the hill, satisfied. The next morning I went back down the hill to recover my prize, only to find that the wasp spray had melted my trophy nest. It hung in pitiful shreds, the corpses on the ground below. Alas!

Patty Broderick
Mooresville

"The Empty Nest" by Eddie Nickens was extremely interesting. Eddie is able to convey his thoughts in such a way that makes you want to read every last word. He can make any subject exciting. We are fortunate to have him as one of the contributors to the magazine.

F. Eugene Hester
Springfield, Va.

No Heel in Tar

The June 2007 story "Coordinating Conservation on the Tar" mentioned that the endangered Carolina heelsplitter mussel is found in the Tar River basin. It is not. The Carolina heelsplitter occurs only in the Catawba and Pee Dee river basins in the southern Piedmont.

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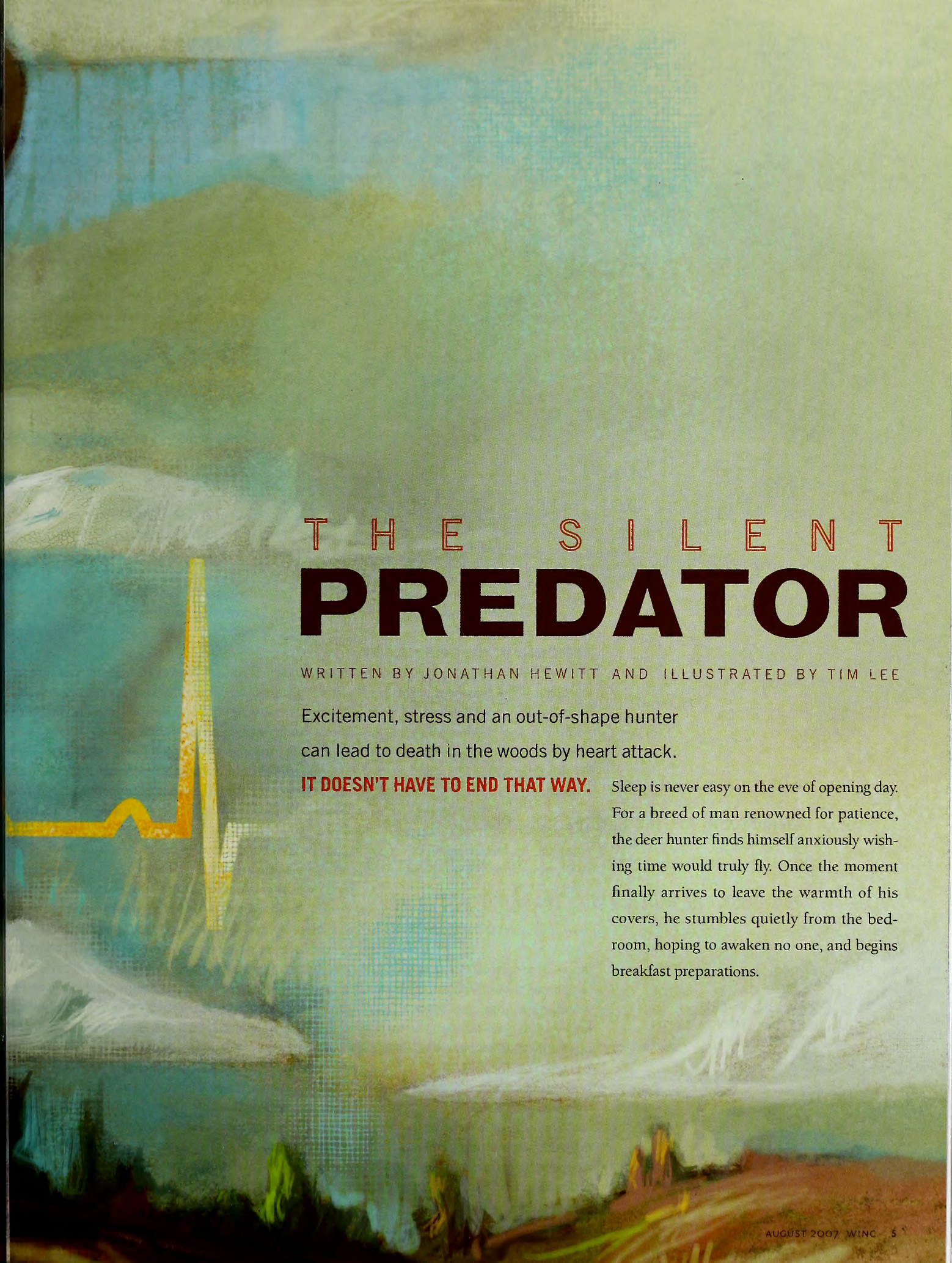


THE SILENT PREDATOR

WRITTEN BY JONATHAN HEWITT AND ILLUSTRATED BY TIM LEE

Excitement, stress and an out-of-shape hunter can lead to death in the woods by heart attack.

IT DOESN'T HAVE TO END THAT WAY.

Sleep is never easy on the eve of opening day. For a breed of man renowned for patience, the deer hunter finds himself anxiously wishing time would truly fly. Once the moment finally arrives to leave the warmth of his covers, he stumbles quietly from the bedroom, hoping to awaken no one, and begins breakfast preparations.

While taking inventory of his gear, the hunter replays hunts from months before, making sure no equipment has been forgotten. The rifle has been sighted in, and the cartridges loaded with the correct ratio of gunpowder to bullet weight specifically balanced for his weapon of choice. For some hunters, a ruckus of eager deerhounds being loaded into a truck shatters the comforting quiet of the darkness. In other areas of North Carolina, the outing begins with only the rustle of gear being piled into a vehicle.

A quick glance at his watch assures a sharp departure. As the hunter drives, memories of hunts both sweet and sour accompany him. He hopes this day will be sweet indeed. After donning his gear, the hunter sets out, but the walk seems farther than he remembered, and, driven by anticipation, he hurries. Once on stand, the nausea he has felt subsides as his innards begin to settle.

After he turns off his guide light, darkness shrouds the forest once again. Silence shortly follows. As if it had rehearsed all year, the surrounding world gradually wakes in unison with the creeping sunrise. *Keep a sharp eye out!* he repeatedly reminds himself. It is easy to forget to look for deer when the birds and mist and creatures stirring about create distractions.

Each moment the sun slides higher, bringing warmth to the air. Daylight has hushed the critters, and the quiet soothes with a hypnotic effect. Then, "Snap!" In hopes of controlling his excitement, the hunter thinks to himself, *It's only a squirrel.* But a visceral thought intrudes: *A squirrel isn't heavy enough to break a twig that size.*

Only seconds after the crack of the limb, the familiar syncopated rhythm of four hooves starts and stops repeatedly, coming closer and closer. The hunter's internal alert sounds, his blood runs warm and all his senses are locked on. From a clearing steps a doe, then another doe and finally *him*, the buck the hunter was tracking last season.

Raise the weapon . . . center the sight . . . click off the safety . . . explosion!

Smoke wanes, and an image appears. The buck is down without motion.

ZEROING IN ON THE HEART

The excitement elicits a tympanic response, and the hunter's heart rate zooms. The hunter admires his kill for several moments before beginning the chore of field dressing. Now, instead of dragging out 160 pounds of deer, he has a carcass weighing 125 pounds and only a quarter mile to travel to his vehicle.

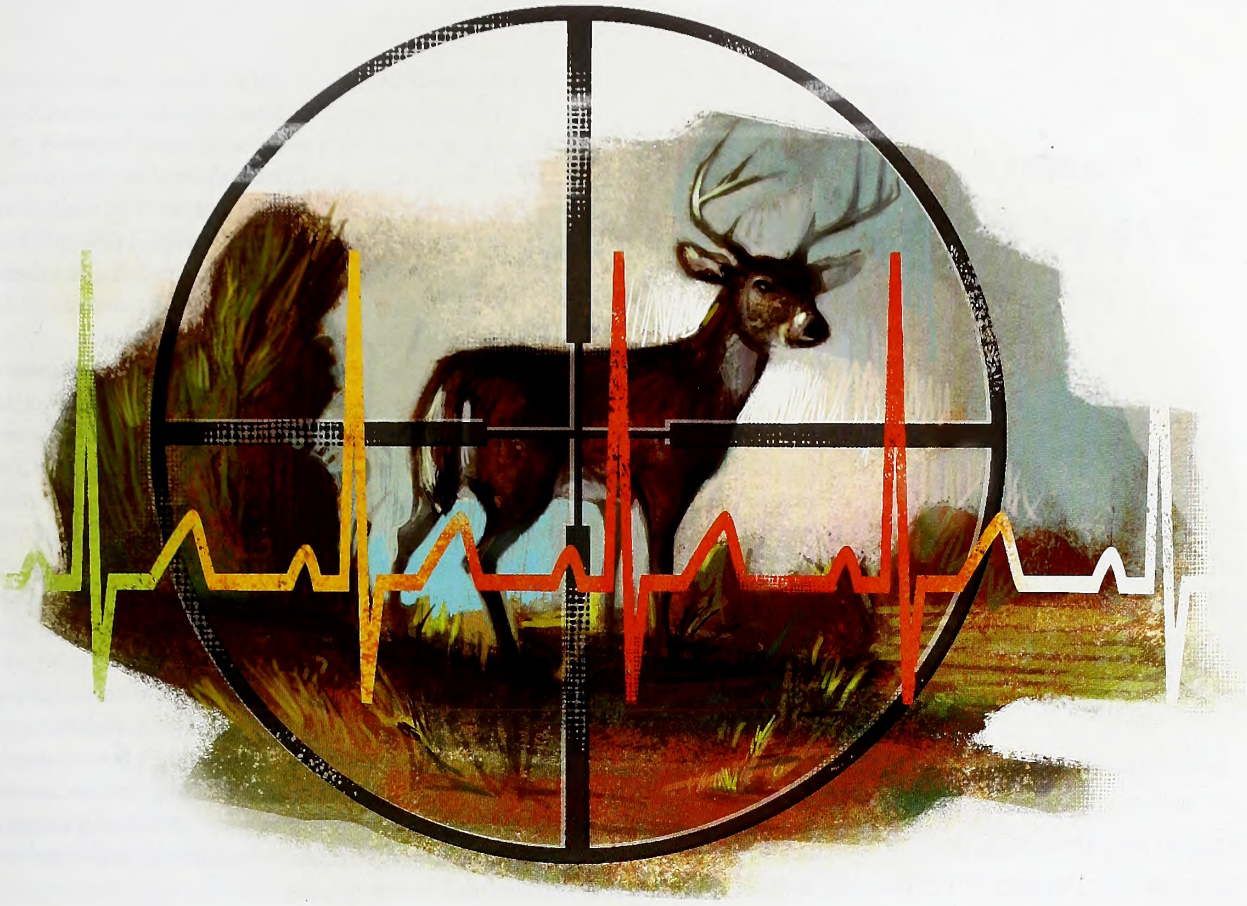
The hunter's internal alert sounds, **HIS BLOOD RUNS WARM AND ALL HIS SENSES ARE LOCKED ON.** From a clearing steps a doe, then another doe and finally ***HIM,*** **THE BUCK THE HUNTER WAS TRACKING LAST SEASON.**

Although the hunter's heart slows, the exertion of field dressing never really allows it to recover. Nonetheless, the hunter commences the journey from the woods one step at a time, while the carcass leaves a trail that reveals the day's events.

Throughout the hunting season, many a hunter will find himself in a similar situation, with one major difference: Some hunters won't make it out of the woods, and others will find themselves en route to the hospital via an ambulance. The culprit? A silent predator, otherwise known as a heart attack.

During the hunt, a hunter's focus is narrow; he thinks mostly of bagging a deer. Few ever wonder what happens to their hearts during a successful hunt. Thanks to research, we now know what does happen during a typical autumn day in the woods. Susan Haapaniemi, a researcher and registered clinical exercise physiologist at the William Beaumont Hospital in Detroit, conducted a study using 25 male volunteers from a local hunting club in Michigan. Each hunter was fitted with a device called a Holter monitor, which reads a person's heart activity, usually for a 24-hour period. In this case it was used to record heart activity during a hunt.

When the data were analyzed, they showed that just walking to the stand produced a vigorous response from the heart. In "Dying with Your Boots On," an article in *Field & Stream* magazine, author Jim Thornton revealed that heart rates averaged 94 percent of the maximum in 21 of 25 subjects just in their walk to the deer stand.



In order to understand the significance of these numbers, let's take a quick look at a military population. Occasionally in my work we take military personnel recovering from injuries on conditioning hikes. On these hikes—30 minutes at approximately 3 to 3½ mph while carrying a pack weighing 60 to 70 pounds—we monitor heart rates. Some subjects' heart rates reach only about 70 percent of the maximum.

Another factor to consider is the latest American Heart Association recommendations, which propose an exercise intensity of 50 to 75 percent of your maximum heart rate. A simple formula is used to determine what that number is. Subtract your age from 220 and then multiply the result by .50 and .75 to find the target heart rate for your exercise zone. An average heart rate percentage of 94 is dangerously high. However, it is worth mentioning that the article "Dying with Your Boots On" notes that study participants traversed terrain that was sometimes rough and hilly, and that temperatures were cold.

When deer approached, Thornton writes, the participants' heart rates averaged 114 percent of their maximum. This, too, is incredibly high, considering that the hunters were not moving much, if at all. The study documented one individual's heart rate rising from 78 to 168 beats per minute at the sight of a deer.

FULL-THROTTLE EXCITEMENT

Reflect on the moments before a deer is spotted. The hunter is typically sitting still, trying to be as quiet as possible. His heart rate is within a normal range, maybe somewhere between 70 and 80 beats per minute. A sudden increase in heart rate can be dangerous for a heart that hasn't been prepared ahead of time. In an exercise setting, the heart's rate increases gradually to allow the body to respond appropriately. In the case of the deer hunter, however, the change is immediate and thus potentially dangerous.

"I've **DONE ALL TYPES OF MANUAL LABOR** in my life. I played football and lifted weights, but **NOTHING HAS COME CLOSE TO DRAGGING 100 TO 200 POUNDS OF DEAD WEIGHT** on dry ground **UP A HILL.**"

After the deer has been shot, tracked and located, the carcass must be dragged to the vehicle. Pittsburgh cardiologist and big-game hunter Dean Wolz says this in the *Field & Stream* article: "I've done all types of manual labor in my life. I played football and lifted weights, but nothing has come close to dragging 100 to 200 pounds of dead weight on dry ground up a hill."

In another study, published by the *Milwaukee Journal Sentinel*, the University of Wisconsin-La Crosse recruited 16 students aged 20 to 28 to drag a 125-pound deer carcass about a quarter of a mile. Researchers documented their heart rates jumping as high as 180 beats per minute, approximately 95 percent of their maximum. The spike in heart rate occurred after only about five minutes of dragging the deer carcass. Imagine the effects after an hour.

Carl Foster, professor of physiology in the Exercise and Sports Science Department at the University of Wisconsin-La Crosse, said in the article, "I've never done anything that intense in my life." Foster described himself as a "52-year-old who runs, cycles, skates and lifts weights." He compared dragging a deer to running a marathon without having trained for it.

"An ounce of prevention is worth a pound of cure" may be an understatement for people who have already experienced a heart attack. Too many times the wisdom of preventive measures rings true only after tragedy strikes. Physical training for deer season might make the difference between life and death for some hunters. The results of training are not evident overnight, just as the symptoms of atherosclerosis do not manifest themselves immediately. It develops over years and decades.

What is atherosclerosis? Imagine a drain in a bathtub or shower. After many uses, dirt and hair begin to clog the pipe, making the inside diameter smaller. Because of the decrease in pipe diameter, the water moves slower and slower, until one day it doesn't drain at all. When a person's arteries that supply oxygen to the heart become clogged, the result is a myocardial infarction—a heart attack. Some of the heart muscle can actually die, and the heart may even stop functioning.

What can you do to lower your chances of heart attack? First, know if you are at risk. According to the Centers for Disease Control, having high blood pressure or high cholesterol, smoking, or a history of previous heart attack, stroke or diabetes can increase a person's chances of suffering a heart attack. Consult your physician to see if you have any risk factors. Conditioning your body for the demands of deer hunting can also lower your risk. But be sure to consult your doctor prior to beginning any exercise regimen.

If your doctor gives you the thumbs up to begin exercising, start by choosing an appropriate goal. If you've never run 3 miles, don't choose that as your goal. Make the goal realistic. For example, try walking, even if only for a mile. As a hunter, you can use your walking as scouting sessions. Just watch out for chiggers and ticks. To become a more successful hunter, spend more time in the off-season not only improving your heart's fitness level but also scouting the areas where you will hunt on foot rather than by vehicle.

Once your original goal has been met consistently, you may want to progress, depending on the demands of your hunting situation. When you feel you have succeeded with your first goal, increase the time or distance by no more than 10 percent, as a general rule. If a hunter begins conditioning his heart in the spring, with a steady progression he could easily be walking several miles by the time fall comes around. Thus he will be able to cover a considerable amount of ground during a hunt.

When I was growing up and hunting with my dad, we usually had several members in our hunting party. Whenever one of us killed a deer, the others could be called upon to help with the chore of dragging the carcass. Usually they would make their way to our stand to admire the kill. Many hunters in eastern North Carolina are members of hunting clubs. This, too, makes for advantageous hunting. Not only are there others to call upon, but also the club members usually have a close relationship with landowners, who will allow them to drive as near to the deer as possible without damaging crops and other valuable property assets in order to retrieve the kill.

Technology is another way to ease the strain of the hunt. Some outdoor gear manufacturers market products to lessen the burden of wrestling a heavy deer. Some products have wheels similar to a wheelbarrow's to transport the carcass. My personal favorite is the cell phone. Not only can you call your hunting buddy to give you a hand, but you can also brag a little while he's on his way. A cell phone is a good idea in case you happen to experience a heart attack or other type of injury. I make it a habit to have my cell phone with me and to let my wife know where I will be in case a search party needs to find me. And considering my poor navigation skills, a search party may be needed, heart attack or not. ◆

Jonathan Hewitt, an Elizabeth City native, is an athletic trainer and occasional contributor to WINC.

According to the Centers for Disease Control, the symptoms of a heart attack are as follows:

CHEST DISCOMFORT

The feeling of uncomfortable pressure, squeezing, fullness or pain. Discomfort in other areas of the upper body can include pain or discomfort in one or both arms or the back, neck, jaw or stomach.

SHORTNESS OF BREATH

This often comes along with chest discomfort but can occur before chest discomfort.

OTHER SYMPTOMS

These may include breaking out in a cold sweat or feeling nausea or lightheadedness.

If you think you or someone you know may be having a heart attack, call 911 immediately.

Don't let this hunting season make you a statistic for the ambulance service. With some planning and a commitment to your own health, the only statistic you will need to worry about is whether your buck scores in the Boone and Crockett record book.

Drumming Up Answers

A tagging program gives biologists greater insight into the habits of channel bass.

written by **MIKE MARSH** *photographed by* **NATE BACHELER**

The red drum goes by many names: redfish, puppy drum, channel bass and spottail bass. The characteristic spot on its tail identifies the fish, as does its color—a coppery to golden metallic sheen on its sides and back. Red drum may have several additional spots elsewhere on their bodies, and the coppery tone may vary depending upon the water clarity where the fish live, with darker inshore waters yielding the classic color of a new penny.

The beauty of the red drum, along with its large size, abundance and extensive range along our coast, led the N.C. General Assembly to declare the species the official state saltwater fish in 1971. Despite that honor, little was known about red drum until the 1980s, when biologists with the N.C. Division of Marine Fisheries (DMF) began tagging the fish. Today, Lee Paramore is the DMF's lead biologist for that tagging program.

Electroshocked juvenile red drum roll to the surface of the water where they are collected by biologists for tagging. Fishermen, biologists and this snowy egret (opposite) can spot red drum feeding in shallow water.

"The red drum tagging program began in 1983, primarily looking at movement and migration patterns of red drum as its key goal," Paramore said. "Over time, it has also been important in telling us what user groups are utilizing the fish, along with the rate at which fish are being removed from the population."

There are two elements of the tagging program. DMF biologists implant internal anchor tags in belly incisions of juvenile fish. The internal anchor holds in place a blue, spaghetti-like streamer that hangs outside the fish. Anglers help out with the other element of the program by tagging a representative sample of the adult fish they catch. These recreational taggers insert a steel dart tag into the fish just below the forward dorsal fin. A yellow streamer tag trails from the dart.

"Once, we used steel dart tags with a monofilament core," Paramore said. "We had problems with those tags, with the sheath slipping away from the core. It was disappointing to receive reports of a previously tagged fish that had only the monofilament remaining where the tag should have been." Modern tags have steel cores and are incredibly durable. They can last many years and therefore will hopefully provide biologists an even more astonishing picture of the movement patterns of the large adult fish.

DMF has tagged many thousands of juvenile fish. Biologists tag them as a side benefit to other projects that target or capture small red drum incidentally. "We've used various methods to catch juveniles, opportunistically getting tags into the water," Paramore said. "In the 1980s we tagged undersized fish caught in commercial pound nets in the sounds. The fish were released in excellent shape. In more recent years we have utilized various techniques including electroshocking and gill nets. We currently tag red drum as part of an ongoing gill net survey. The survey is designed to provide us with an abundance index of key estuarine species, including red drum. We catch them in overnight net sets and tag them in the morning."

Paramore said that so much insight has been gained into the movements of juvenile red drum that DMF has scaled back the directed-effort numbers of channel bass its biologists tag. But volunteer recreational taggers continue to mark lots of adult fish.

VOLUNTEER TAGGERS

"Norman Miller is our No. 1 tagger," Paramore said. "He tags more than 500 fish out of Ocracoke. In 2006 two fish he tagged at Ocracoke Inlet more than 12 years ago were recaptured in western Pamlico Sound. One set the record for the longest time a fish has been at large since the inception of the tagging program. It was recaptured 13 years, 10 months and 22 days after being tagged.

"We've seen more than 100 volunteers come and go from the program, with the annual number around 25," Paramore said. "We've tried to recruit taggers who consistently capture large red drum and provide reliable data. We are currently not seeking new volunteers at this point, but we do occasionally take on additional taggers. If someone is really interested and keeps calling, we may add them to our list of taggers and provide them with a kit. Currently, we only have limited resources to fund the volunteer tags."

When a volunteer is accepted, that person receives a kit containing instructions for implanting tags, several dozen tags, an implanting tool, a measuring tape and data sheets. The angler records the date, tag number, fork length (measurement from the most anterior part of the head to the fork of the tail), location, condition of the fish, name of the tagger, estimated weight, percent of cloud cover, time of day, state of the tide, and wind speed and direction. Each year the tagger sends the information to the DMF's field office in Wanchese, where technician Carol Etheridge adds the details to the database.

The tag is imprinted with a number and the text "Reward—Send fork length, tag no., date, location, phone no. to NCDMF, Box 769, Morehead City, N.C." Anyone catching a tagged fish is urged to report the information to DMF. But merely writing it down may not be good enough. Committing it to memory can be even worse.

"We would rather an angler cut off the tag and mail it to us," Paramore said. "In the excitement of catching and releasing a fish, the angler can make a mistake in memorizing the tag number or forget to write it down. All too often, a wrong tag number is reported. It's more important to get us the correct information than is the possibility a tagged fish may be captured again. If one of our volunteer taggers catches a tagged fish, we prefer they send us the old tag and insert a new tag."

HOME-GROWN BOUNTY

Anyone reporting a tagged fish gets a reward of $5 or a special red drum project ball cap. Most anglers prefer the cap.

One of the most important pieces of information about red drum gained from the tagging program is that most of North Carolina's fish remain in the state. Therefore, it shows that the catch-and-release ethic of recent years is helping create better fishing.

"Some of the real basic information started with juvenile fish," Paramore said. "Tag returns show they don't move a lot. In the first year or two, they remain in the same general area, moving the most in fall when temperatures change. Many times you tag a group of fish in sequence and then after a time, you get two or three recaptures, with some of them coming back in the same sequence in which they were tagged. We do tend to see movement out of the upper estuaries and toward the coastal inlets and ocean beach fronts as the red drum follow the flow of bait out of the estuaries, although many of the smaller red drum will remain in the estuaries."

Tag returns show that as these fish become older they tend to spend less of their time in the upper estuary and more time in the higher salinity areas in and around the coastal inlets. This is particularly evident by the time the fish reach ages 2 and 3 and lengths of 22 to 30 inches. Once they reach age 4 and achieve a length of 32 inches, the fish are mature and become more difficult for anglers to find because they spend more time in the ocean. These mature red drum also begin to join the adult segment of the population, where they will achieve lengths of 40 inches or greater. At around 40 inches, growth in length slows as the fish begin to add more weight and girth.

"We've found our adult red drum have a predictable pattern, with a large population

Now that red drum tagging has given fishery managers some valuable insights, the information is being used to formulate government-mandated fishery management plans to ensure the long-term abundance of all age classes.

in Pamlico Sound and Neuse and Pamlico rivers," Paramore said. "They spawn in these estuaries from August through October, which surprised us. Historically we thought spawning was more prevalent at coastal inlets, not inshore."

After spawning, the big fish, which can reach more than 50 pounds over a lifespan of 50 years, move toward the inlets again. In November and December, the surf fishing picks up for the big adult fish before they head offshore to spend the winter.

"In January through March, our few tag returns have come from offshore, with some returns in the National Marine Fisheries Service trawl surveys," Paramore said. "In spring they follow the same migration routes, back to the surf in March, to the inlets in April and May and then back in the sound again in summer and fall. The predictability of these migration patterns is the real eye-opener. Some fish have been tagged for 10 years and have returned to the same location at the same time year after year."

A few tagged fish travel out of state and other tagged fish come to North Carolina from Virginia and South Carolina. Nevertheless, most red drum tagged in North Carolina are recaptured here.

"Ninety-nine percent of our tag returns are from fish recaptured in North Carolina," Paramore said. "We see some fish come down in the fall from Virginia, migrating south as the water temperatures cool. The Virginia red drum appear to meet and mix with our Pamlico fish off Cape Hatteras. There are also some fish tagged off North Carolina's Outer Banks fishing piers in the fall that are presumably migrants from Virginia. But we typically see a very distinct separation between our fish and the fish from Virginia after the fish move away from Cape Hatteras. Farther to the south, we also see a separation in fish tagged north and south of Cape Lookout. Fish tagged north of Cape Lookout are typically not recaptured south of Cape Lookout, with the reverse also being true."

From 1983 to 2006, 45,295 red drum were tagged in North Carolina. The lowest number of tags implanted in a year was 92, in 1983. The highest number implanted was 3,951, in 2006. The total number of tags returned as of early May 2007 was 4,773—10.5 percent of the total. That's a whopping percentage of tag returns for the study of any species, whether bird, beast or fish. It speaks volumes for the survival rates of red drum and their ability to grow old, as well as for the durability of the tags and the care taggers have used while implanting them.

Typically 15 to 20 percent of tags returned annually are from juvenile fish. The returns decline as the fish grow larger because they become more difficult to catch. For adult fish over 40 inches in length, tag returns average only 2 or 3 percent.

"The high catch rate for juvenile fish we discovered by tagging had a direct impact on our regulations," Paramore said. "The size limit was increased after our tagging program showed that juvenile fish were subject to higher fishing pressure."

Despite higher returns for tagged juveniles, there are reasons for having recreational taggers target larger fish. Anglers cannot legally keep fish over 27 inches in total length, thus the adult fish are likely to remain at large for long periods. They also are less

likely to be injured by the larger dart tags, which are implanted 1 inch deep into the fish's back, and they can withstand being handled by amateurs.

"A 27-inch red drum has the reputation of being a really tough fish, and due to the type of tag we are using, we like our volunteers to tag fish at least that long," Paramore said. "A big red drum can take rough handling better than many fish, but there's no need in stressing the fish any more than absolutely necessary. A good tagger can remove the fish from the water, implant the tag and release it in about 30 seconds. You shouldn't handle the fish by the gills, and it's important to have the tag already in the implanting tool for speed. You also have to keep the fish from flopping around and injuring itself. Placing the fish on a wet towel is a good idea. Avoid dropping or allowing the fish to flip upside down or it may have trouble orienting itself once it is returned to the water. If the fish is disoriented or stunned, it's important to hold the fish in the water until it revives enough to orient itself for swimming before it is released."

Now that red drum tagging has given fishery managers some valuable insights, the information is being used to formulate government-mandated fishery management plans to ensure the long-term abundance of all age classes. And there is another aspect of the volunteer tagging program that is harder to quantify yet has gone a long way toward restoring the fish, which once had dramatically reduced numbers in the state because of overfishing.

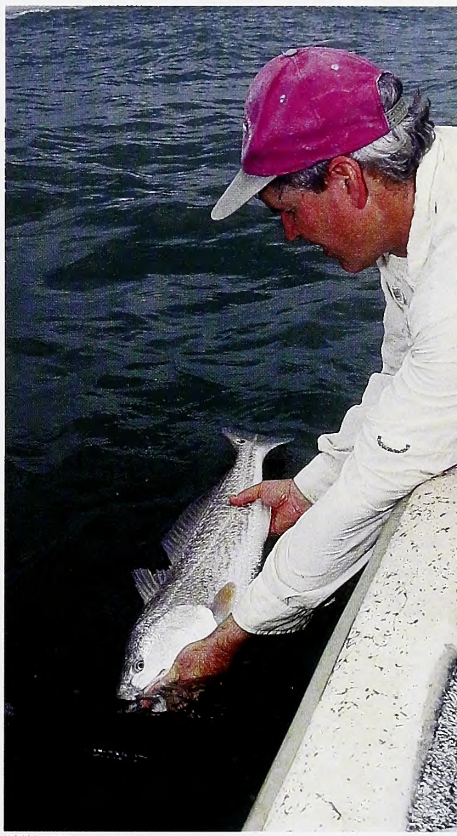
"The volunteer tagging program has given us a better handle on red drum, but it's also been an excellent way for the division to educate fishermen on the importance of protecting adult fish," Paramore said. "The tagging program is now an integral part of our understanding of the fish, and I believe it has played a key role in the very high ethical standard among recreational anglers for releasing them. Most of the red drum captured in North Carolina waters were spawned in North Carolina waters. We know if we protect our fish, then we are the direct beneficiaries of our own actions. We control our own destiny when it comes to red drum." ◆

Frequent WINC *contributor Mike Marsh is a freelance writer in Wilmington.*

Most red drum have one dark spot near the tail, but multiple spots (opposite) are not uncommon. Before an internal tag is inserted (bottom) and the drum released, an angler records such information as fork length, condition of the fish and location of the catch.

JOHN MAUSER

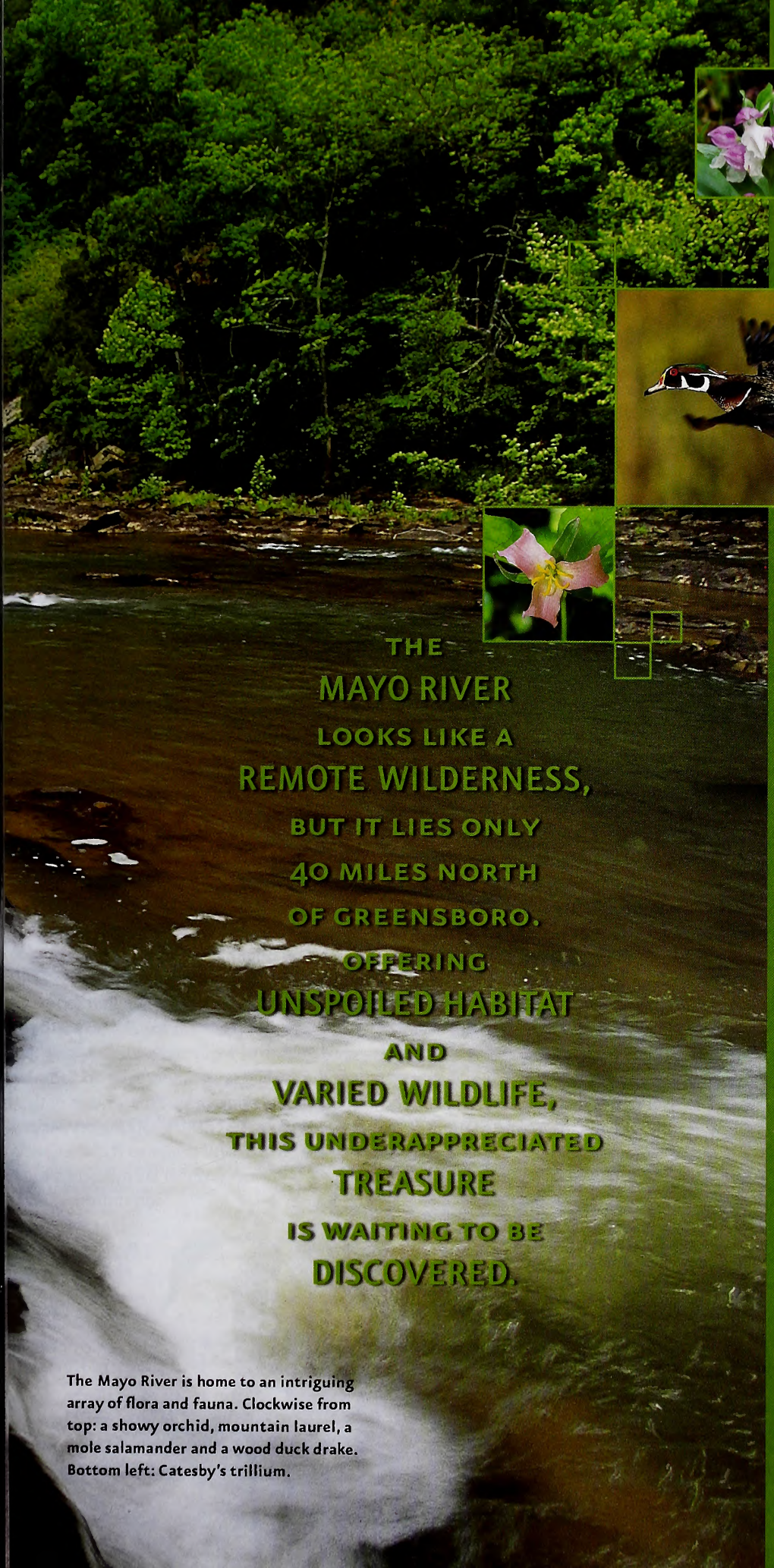
MIKE MARSH



MIKE MARSH

IN PLAIN SIGHT

written by Sidney Cruze □ photographed by Melissa McGaw



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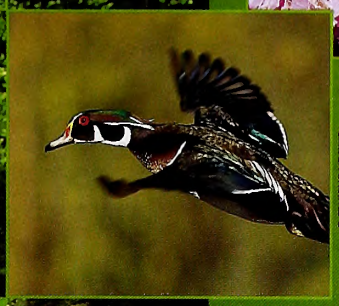


F. EUGENE HESTER

TODD FUSSER

THE MAYO RIVER LOOKS LIKE A REMOTE WILDERNESS, BUT IT LIES ONLY 40 MILES NORTH OF GREENSBORO. OFFERING UNSPOILED HABITAT AND VARIED WILDLIFE, THIS UNDERAPPRECIATED TREASURE IS WAITING TO BE DISCOVERED.

The Mayo River is home to an intriguing array of flora and fauna. Clockwise from top: a showy orchid, mountain laurel, a mole salamander and a wood duck drake. Bottom left: Catesby's trillium.

On a spring afternoon, I stand on the sandy shore below the bridge at Anglin Mill Road, watching the Mayo River tumble, gurgle and bubble its way downstream. As I pull my kayak toward the water and feel the damp air on my face, I imagine I've found a remote mountain wilderness, a river to call mine for the day. It's hard to believe I'm just 40 miles north of Greensboro.

Nestled in the rolling hills of northwest Rockingham County, the Mayo takes you to a world populated by coyotes, great blue herons and river otters. The clean, clear waters provide habitat for smallmouth bass, endangered species such as the James River spiny mussel (*Pleurobema collina*), and rare fish including the riverweed darter (*Etheostoma podostemone*) and Roanoke hog sucker (*Hypentelium roanokense*). Dramatic cliffs rise along the banks, and rock formations relate the forested gorge to geologic events that shaped the landscape millions of years ago.

The Mayo supports an abundance of flora and fauna found in both the foothills and the Piedmont. It offers formidable rapids to run, as well as places to fish, swim and hike. Soon, these riches will be protected by a state park, and people who explore the Mayo will find that there's something for everyone to enjoy.

"GETTING DOWN THE STAIRCASE IS LIKE GOING TO SCHOOL . . . YOU'LL LEARN EVERYTHING YOU NEED TO KNOW TO MAKE IT THROUGH THE BOILING HOLE."

The Class III rapid Boiling Hole is what gives the Mayo River its reputation for having the finest white water in the Piedmont. Above, Mike Covey kayaks that section of the river.

WILDERNESS PADDLE

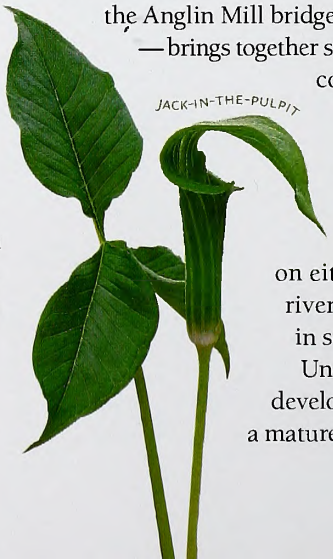
The north and south forks of the Mayo surface in Patrick County, Va., and flow southeast before coming together just above the North Carolina state line. The river then crosses into Rockingham County and flows south for 16 miles before it joins the Dan River at Madison. With five tributaries, the Dan constitutes the upper third of the Roanoke River Basin, extending from Meadows of Dan in Virginia to the Kerr Reservoir, or Buggs Island Lake, north of Oxford.

For all its scenic beauty, the Mayo is best known in boating circles for having two personalities. It starts as a shallow, fast-moving river, then widens and slows to a meander through the floodplain. The combination makes it an ideal recreational spot that offers two distinct river experiences. Avid paddlers can plunge into a whitewater adventure, and beginners can ride at a leisurely pace down placid currents.

Boaters looking for natural beauty plus the thrill of Class II and III rapids will find both in a 5-mile section of the upper Mayo that starts on the South Fork at Moore's Mill Road bridge in Virginia and ends just below the Anglin Mill Road bridge. After a 3-mile paddle to the North Carolina border, Fall Creek appears on the right, revealing the river's most dramatic waterfall—a 15-foot cascade called Fall Creek Falls. A quarter mile below the creek sits a string of ledges and Class II rapids that longtime river runner Lindley Butler calls the Grand Staircase. "Getting down the Staircase is like going to school," he tells me. "You'll learn everything you need to know to make it through the Boiling Hole."

The Boiling Hole is a Class III rapid that single-handedly gives the Mayo its reputation for having the finest white water in the Piedmont. Boaters come from Greensboro, Raleigh and as far east as the North Carolina coast to maneuver through the 3-foot drop. Below the hole the river crosses a fall line, descending another 12 feet over a series of rocks that form a second Class III rapid called the Blender or the S-Turn. "This is it," Butler says, "the best white water you can get until you go to the mountains."

Within a quarter mile of the Anglin Mill bridge, the Mayo smoothes out into flat water. A friend and I push our kayaks off a spit of sand below the froth and paddle upriver to see the rapid's stone underbelly and admire the pristine wilderness. This section of the river—from the North Carolina border past the Anglin Mill bridge to Buffalo Creek—brings together six different natural communities, making it especially beautiful and biologically diverse.



The bluffs on either side of the river rise to 100 feet in some places. Undisturbed by development, they host a mature hardwood forest

that is home to majestic beech, red oak and white oak trees, some almost 3 feet in diameter. Showy orchid, jack-in-the-pulpit and trillium bloom in the spring, and mosses and lichens are abundant. In the summer the forest floor is dotted with the delicate fronds of maidenhair ferns and purple Jacob's ladder.

Farther downriver large boulders form a cliff almost 30 feet high. Here, chestnut oak dominates the hardwood forest and mountain laurel borders the rocks. Some are moss covered and some are shaded by wild azalea, flowering dogwood, rhododendron and fringe trees. Between the branches I catch a glimpse of shadows and caves, possible homes for the black bears that move through the area.

Wildlife is scarce during our daylight paddle, but bird calls reverberate throughout the forest. Wood ducks and Canada geese lead us down the river, while a red-tailed hawk circles above the treetops. Ed Corey, an inventory biologist with the N.C. State Parks Division, tells me the Mayo is home to the usual array of Piedmont wildlife. "The river's varied typography, higher elevation, aquatic habitat and diverse natural communities make it unusual, though," he says. "The area is untapped. We don't know yet what's out there, and it's full of possibilities."

As the Mayo widens and slows, whitewater streams continue to feed it. Hickory Creek pours over broad rocks stacked end to end and then spills into shallow pools, creating an ideal lunch spot for anyone looking for shade or salamanders. The mole salamander (*Ambystoma talpoideum*) breeds in the ephemeral wetlands found along the Mayo. Chunky, with a large head and pale blue flecks on its belly, it is secretive and uncommon in North Carolina. Persistent wildlife watchers might find one burrowed under a damp log.

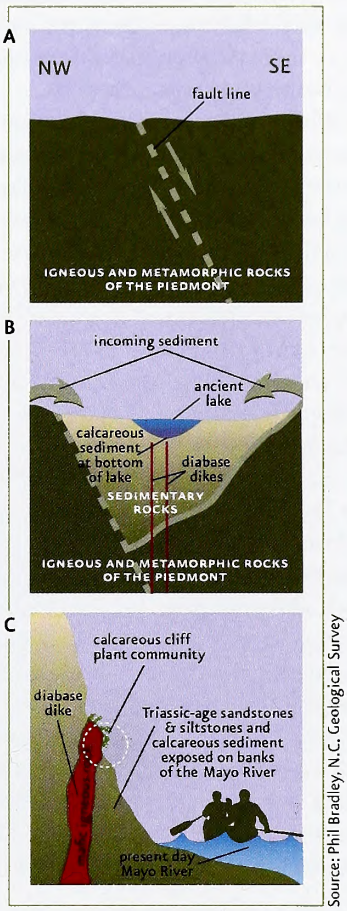
GEOLOGY AND BOTANY

The Dan River Triassic Basin formed when the North American and African plates separated. As the continents split, cracks formed in the earth's surface, opening up rift basins. Ancient rivers deposited sediment into the basins, forming layers of sedimentary rock. One of those layers, a mix of limestone and other sedimentary rock, is found on the Mayo's east bank, opposite Mayodan, at Cedder Mountain. This site offers one of the state's best known exposures of steeply dipping Triassic sandstone and siltstone. Because these soft sedimentary rocks erode easily, it is unusual to see them exposed as the Earth's first layer. Here they form north-facing cliffs that drop more than 100 feet to the river.

Most of the Piedmont is composed of either crystalline or volcanic igneous rock. But Cedder Mountain is a mix of calcareous sedimentary rock—containing calcium carbonate that, when weathered, makes it pale and crumbly—and mafic igneous rock, high in magnesium and iron. It is hard to see the calcareous rock or the darker igneous rock because of the vegetation. The basic soils associated with sedimentary rocks, combined with the acidic soils that are more common in the area, create a home for rare plants such as cliff stonecrop (*Sedum glaucophyllum*) and glade bluecurls (*Trichostema brachiatum*). The plants make up one of North Carolina's rarest natural communities, the Piedmont Calcareous Cliff Community. To the trained eye, they illustrate the link between plant communities, underlying soils and geology.

THE HUMAN STORY

Although the lower stretch of the Mayo lacks the excitement of Class III white water, it does have Class I rapids with a few



Source: Phil Bradley, N.C. Geological Survey

THOMAS G. BARNES, USDA-NRCS

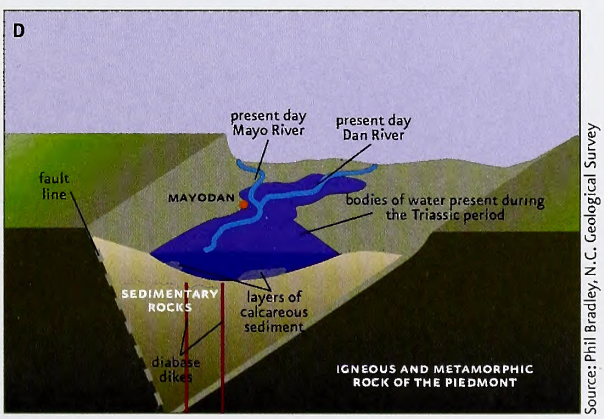
GLADE BLUECURLS

G.A. COOPER, USDA-NRCS

CLIFF STONECROP

THE DAN RIVER TRIASSIC BASIN

The formation of the Dan River Triassic basin began when the supercontinent Pangea split apart about 245 million years ago. Faults **(A)** split open the Earth's crust, forming a sedimentary basin **(B)** that collected sediment from the eroding igneous and metamorphic rocks of the surrounding Piedmont. Ancient lakes formed within the basin, leaving behind calcareous sedimentary layers between the more typical sandstones and siltstones of the basin. Hot molten mafic magma later intruded the layers of the basin during the Jurassic Period, forming diabase dikes. The ancient lakes have long since dried up and have been buried by additional sediment. Through erosion, these rocks are exposed **(C)** on the surface along the Mayo River today. This conceptual diagram **(D)** shows the geology of the Dan River basin with the modern-day locations of Mayodan and the Mayo and Dan Rivers.



Source: Phil Bradley, N.C. Geological Survey

riffles and small waves. Paddling up to one, I hesitate and then steer my boat down the path of least resistance into the glassy tongue of water that extends down the center of the river. Without realizing it, I have just paddled through the middle of a fish weir built about a thousand years ago.

Spanning the river and pointing downstream, these V-shaped rock formations are traps that American Indians used to catch fish. As the fish swam downriver, the Indians drove them through the narrow opening at the bottom into nets or baskets.

Butler, a history professor emeritus at Rockingham Community College, first learned of the fish weirs 25 years ago and has been studying them for the last three. He tells me almost a dozen of these weirs still exist on the Mayo, most of them between Anglin Mill Beach and Highway 770. They were built by some of the earliest humans to live along the Mayo, the Dan River People, believed to be ancestors of the Saura Indians who left the basin after 1700.

Sometime between 800 and 1200 A.D., the Woodland culture in this region started to form small population centers where the inhabitants lived over time and grew crops such as corn and beans, Butler says. "A good-sized village at the time had several dozen people in it, which made the fish weirs possible. They are large in size and made of large rocks; they required manpower. But the fish weirs are not dateable, so you have to find a correlation on land." By studying the area's archeology surveys, Butler discovered that Woodland village sites existed near the weirs. Then, he used the village sites to determine the age of the weirs.

Fish weirs represent an ancient technology used by indigenous cultures all over the world. Today, conservationists are reviving it to support stream restoration. The weirs protect banks from erosion and create scour pools under the rocks where fish can feed.

Butler believes that early European settlers took advantage of the weirs along the Mayo, keeping them in repair long after the Saura were gone. As an example, he points out that one fish weir near Hickory Creek has a pegged log as part of its framework, definitely a modification to the original rock structure.

Modern anglers relying on rod and reel to make their catch will find that the Mayo offers common sunfish species, such as bluegill and the brightly colored redbreast, as well as smallmouth and largemouth bass. Smallmouth occur in few Piedmont rivers, and spring is an ideal time to find them. While moving upriver to spawn, they build circular nests close to the riverbanks, which makes them more visible than usual.

By the early 20th century, the river supported more modern technology. The Avalon Dam was built 2 miles east of Mayodan in 1899 to power operations at the Avalon Mill. On June 15, 1911, the four-story mill burned, and it never reopened. Families living nearby in Avalon village—now named the Avalon Industrial Site—hitched up horse teams, put log rollers under their houses and moved the buildings to neighboring towns. In the 1930s the textile industry added a second dam to the river, the Mayo Dam. It sits south of the Avalon Dam, across from Mayodan near the old Mayo Mill site. Both dams still generate electricity today.

For almost half a century, Washington Mills Company was one of Rockingham County's biggest employers. The company's Mayo Mill, a cotton mill, opened in 1896 along the river, upstream from the Dan River confluence. The town of Mayodan grew up around the mill. In July 1948, Washington Mills opened a riverside park for mill employees and Mayodan families. Almost 3,000 people attended the dedication. Located north of Mayodan and covering 415 acres, Mayo Park had an athletic field, parking for 420 cars, a picnic shelter, a bathhouse and two lakes—one for swimming and boating, the other for fishing.

The park closed in the early 1960s but received national attention last year when local residents discovered that Washington Mills had hired renowned architect Antonin Raymond to build the park structures. Raymond studied with Frank Lloyd Wright and, like Wright, designed his buildings to complement the surrounding environment. An *Architectural Record* article of September 1950 reveals that Raymond designed the picnic shelter with native materials. The columns and rafters consist of hickory, the main roof is covered with cedar shingles, and the fireplace is made of local stones.

Today, Old Mayo Park is an emotion-inducing landmark for Rockingham County residents who grew up in the 1950s. It was the first place many of them learned about nature and the outdoors.

"THE RIVER'S VARIED TYPOGRAPHY, HIGHER ELEVATION, AQUATIC HABITAT AND DIVERSE NATURAL COMMUNITIES MAKE IT UNUSUAL."

PROTECTING THE RIVER, CREATING A PARK

With its rich history and natural beauty, the Mayo is easy to appreciate for those who love getting on the water. In the fall of 2001, Butler was relaxing with friends after a paddle when they agreed they had a natural treasure worth preserving. "We have been enjoying this wilderness for more than 30 years, but we knew it wouldn't last forever," Butler says. "Development was heading this way, and we wanted to do something to save what we have."

They didn't waste time. By February 2002, the Dan River Basin Association (DRBA) was incorporated. Unlike many environmental nonprofits, DRBA was formed *before* there was a defined threat to the natural and cultural resources it protects. "It's rare to protect rivers before development or pollution causes problems," Butlers says, "but it made sense to us."

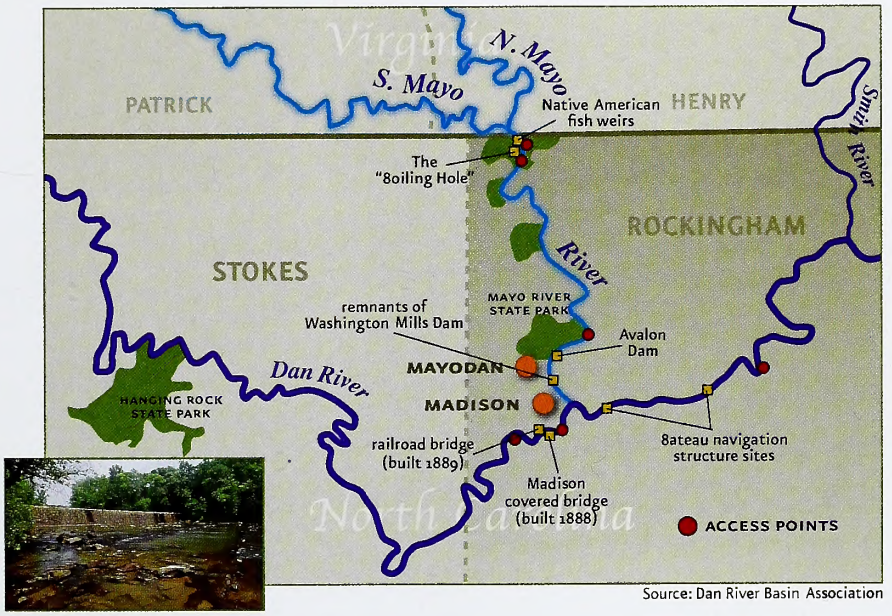
For years Rockingham County residents and state park staff had hoped to create a park on the Mayo, but funding was never available. In 2003, after the N.C. Division of Parks and Recreation identified the river as one of 13 sites to be added to its New Parks for a New Century initiative, DRBA collected resolutions of support for the park from six local governments, three chambers of commerce and 11 civic organizations. The strong local endorsement guaranteed unanimous approval for the legislation that established the park.

Like those along the Eno and New rivers, the 12-mile linear park will follow the river corridor. From the North Carolina border south to the old park site, it will include hubs of land for water access and offer hiking trails and primitive campsites. No opening date has been set, but state money has been allocated to restore the historic buildings in Old Mayo Park—the proposed headquarters—and fund four staff positions. A superintendent has been hired.

The state is working to acquire parkland from local landowners with help from the Piedmont Land Conservaney, a land trust that works in nine Piedmont counties, including Rockingham. Roughly 1,600 acres are protected, including Old Mayo Park, the Avalon Industrial Site and land near Fall Creek Falls and Hickory Creek. Park staff hopes that, once completed, the park will total more than 3,000 acres and include wayside exhibits highlighting the area's unique history and geology.

Even now the park promises more outdoor activities than many people can explore in one visit. At the end of our paddle, I dipped my hands in the cool water and marveled at the lush landscape. I think of all the Mayo has to offer and all I didn't see—the waterfalls, swimming holes and hidden hiking trails. I will return. ◆

Sidney Cruze is a freelance writer who lives in Durham. She writes about land conservation and sustainable agriculture.



AVALON DAM

GREAT BLUE HERON

Mark Bishopric of Three Rivers Outfitters (left) canoes on the north fork of the Mayo near the Moores Mill Road access.

MAYO RIVER STATE PARK

LOCATION: Rockingham County, about 40 miles north of Greensboro.

ACCESS: A park office and interim facilities, which will likely include picnic grounds and hiking trails, are expected to open next summer. Those who want to explore the Mayo now can log on to the Dan River Basin Association's Web site at www.danriver.org for information about guided hikes and river trips.

PADDLING: Perfect for experts and beginners. There are two access sites: Mayo Beach Upper Access (also called Anglin Mill Beach) off Anglin Mill Road, north of Stoneville and west of U.S. 220; and the 220 Bridge Access at the Business 220 bridge, 1½ miles north of Mayodan. Those wanting to paddle from the Mayo Beach to the 220 Bridge should allow at least four hours, plus whatever time they spend exploring the river. To find out more, log on to the Rockingham County Web site at www.ncnorthstar.com.

RECREATION: Recreation facilities for camping, boating and fishing will be determined by the state park's master plan and built in the next few years. Primitive walk-in sites as well as tent and trailer sites are now available nearby at the Dan River Campground, (336) 427-8530.

INFORMATION: Log on to the Mayo River State Park Web site at ils.unc.edu/parkproject/explore/mari/new_home or call (919) 715-8709.

RICHARD T. BRYANT

RIVERWEED DARTER

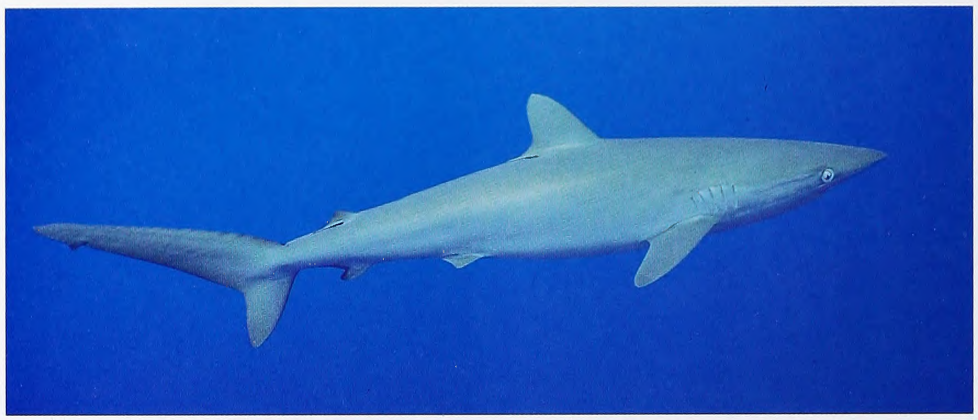
~ The Sharks of Summer ~

Although our coastal waters can be home to many varieties of shark, there's no need to retire your swimsuit just yet.

written by Jay Barnes
photographed by Todd Pusser

SANDBAR SHARK

On a warm, breezy afternoon in late July 1980, a surfer near the Emerald Isle Pier was blindsided by a large, dark fish. Bumped off his board and knocked into the breakers, he quickly realized he'd been hit by a good-sized shark. He scrambled to shore and reported the incident, which was the first event in that summer's local "shark frenzy."



SILKY SHARK

In the days that followed, anglers reeled in 5-foot sharks off the Triple S and Iron Steamer piers, and the phones started ringing at the Atlantic Beach Police Department about fins spotted in the surf. On Aug. 8, local marine scientists came forward to confirm that thousands of sharks had moved into shallow water near the beaches from Cape Lookout to Swansboro. Word spread quickly throughout the community, and the story attracted national media attention.

"We closed all the beaches to protect the swimming public," remembers Frank Schwartz, professor and curator of fishes at the UNC Institute of Marine Sciences in Morehead City. "Setting the longlines revealed that there were sharks along the beach. We told the mayors of the possible danger, the mayors told the cops and warning signs went up."

Schwartz explained that an abundance of food and an unusual surge of very warm water near the beach had drawn the sharks close to shore. "There were all kinds: sharpnose, blacktips, spinners and sandbars," he said. A cold front moved through and pushed the warm water away, taking many of the sharks with it. The beaches were reopened, warning signs came down and no further incidents were reported. "A wave of humanity came out of the surf that day for fear they were going to get bitten by sharks," Schwartz said.

GREAT WHITE SHARK

The "Jaws" Factor Just a few years before, in the summer of 1975, the public's perception about sharks was forever changed with the release of Steven Spielberg's blockbuster film "Jaws," based on the Peter Benchley best seller. Because of this movie and others like it, some people who vacation on the North Carolina coast even today have to suppress fears of menacing great whites in order to enjoy a romp in the surf with their families. The real story for swimmers along our coast is much less dramatic: Experts suggest that we should not worry, as shark attacks here are quite rare. Tens of thousands of surfers, waders and swimmers enjoy the ocean each summer without incident. Although there are certainly sharks along the beaches, it's very unlikely they'll ever bother humans (see the sidebar "Shark Attacks in North Carolina, p. 27").

We know a great deal about sharks off our coast thanks to the efforts of Schwartz, who has studied them here for the past 40 years. He and his team of researchers began a shark sampling study in 1968 that continues today. Each year from April to November, Schwartz's crew goes out to sea every two weeks. From the deck of the *Capricorn*, they fish a 3-mile-long line with baited hooks every 15 feet. They set their lines in two areas—one just a mile off Shackleford Banks and the second 7 miles offshore beyond Cape Lookout.

Moonstruck "About 8,000 sharks have been caught in 38 years of sampling twice a month," said Schwartz. The catch usually includes a variety of common inshore species such as blacktips, sandbars, spinners, bulls and hammerheads. Their largest specimen was a 14-foot dusky shark, and they've also landed a 12-foot great hammerhead. All sharks are tagged and released for migrational studies. Schwartz's records show the peak month for catches is July, followed by May. Interestingly, he finds a pattern in the data from his study. "I'm convinced the moon phase is very, very important," says Schwartz. "We have consistently caught the most sharks on the dark of the moon and in the first quarter of the moon."

The study also reveals the wonderful diversity of sharks found off the North Carolina coast. According to Schwartz's book "Sharks, Skates and Rays of the Carolinas" (published by UNC Press), 56 species of sharks are known in North Carolina waters, with 28 species listed as common. Yes, the great white is among those found here, but sightings are

rare and usually reported miles offshore. Among the most common species are smaller sharks that fill nearshore waters in summer, feeding and breeding out of sight of most swimmers, surfers and fishermen. Some larger varieties come near shore as well, and a few commonly venture into our sounds and even rivers.

Most of North Carolina's sharks migrate in during spring or fall as water temperatures fluctuate, their numbers and diversity peaking with the heat of late summer. But before the summer-occuring sharks move into the warm waters, cool-water species spend some time here.

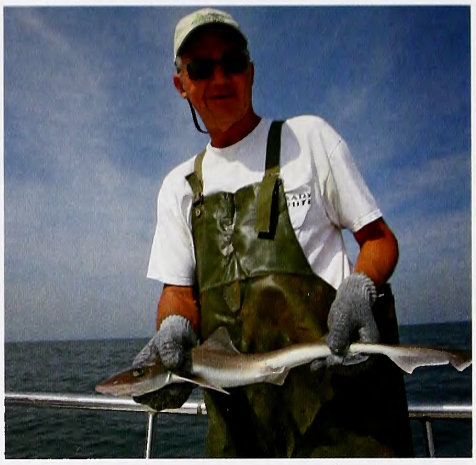
Cool Runnings Sometimes exceeding 20 feet in length, basking sharks (*Cetorhinus maximus*) are large, black creatures that swim our coastal waters from November to April. Like the massive whale sharks, basking sharks are filter feeders that are not considered to be particularly dangerous. Still, they've been known to frighten winter surfers when they roll and splash in waves at the beach surf. By April, basking sharks have begun their migration northward, often passing through Pamlico Sound on their way toward cooler waters.

Another common cold-water shark is the spiny dogfish (*Squalus acanthias*), which is frequently seen in large schools through fall and winter along the Outer Banks. These sharks were commercially harvested in North Carolina for years, but now the dogfish fishery has all but stopped due to a federal management plan that cited concerns over stock size and reproductive rates. Once processed, the fish's meat is served in Europe as "fish and chips." Spiny dogfish, like the similar smooth dogfish (*Mustelus canis*), sometimes exceed 4 feet in length, but they are considered harmless. Both species migrate northward in spring as waters warm, though pregnant females often linger to "pup" their young in shallow waters in July along the coast. Summer fishermen on piers and beaches inadvertently catch these young, which they call sand sharks (though there is no species with that name).

The Long, Hot Summer While the dogfish are moving out, slender, 3-to-4-foot Atlantic sharpnose sharks (*Rhizoprionodon terraenovae*) are among the first warm-water sharks to move in. From early May until October, the sharpnose is the most abundant shark in North Carolina waters. Thus it is the species most commonly spotted off the beach and most frequently caught by fishermen. Many individuals migrate in from the south, but others live year-round in the Gulf Stream-warmed waters offshore. The sharpnose is considered harmless, unlike the blacktip shark (*Carcharhinus limbatus*), which Schwartz cites as the culprit behind a handful of local attacks on swimmers in recent years.

Blacktips arrive here in May from Florida, many measuring in the 5-to-6-foot range. They're common near the surface in shallow waters just off the beach and are frequently caught on ocean piers from Nags Head to Sunset Beach. They're often seen in Core and Pamlico sounds and in the Cape Fear River near Southport.

Frank Schwartz is shown here on a sampling trip measuring a sharpnose shark (top left), setting a longline (top right) and inserting a tag. Sampling trips like this are what give Schwartz the raw data needed to keep track of the behavior of the sharks on our coast.



A stranded basking shark (above) at Cape Hatteras. Bill Steenland holds a spiny dogfish (above, right). The scalloped hammerhead (below) is just one of the many visitors to our coast each year.

Fishermen sometimes confuse blacktips with spinner sharks (*Carcharhinus brevipinna*), as both species make spectacular leaps out of the water, twirling through the air before splashing down again. This eye-catching behavior is thought to help them remove parasites or shark suckers from their bodies. With darkened fins, spinners and blacktips are similar in appearance. Spinners migrate into nearshore waters in May and early June, just after the blacktips. Their highest concentrations are south of Cape Lookout, where water temperatures are warmest.

At about the same time, another common shark arrives—the blacknose shark (*Carcharhinus acronotus*). Blacknose are small, slender sharks, usually less than 5 feet in length, named for the noticeable dark smudge at the tip of their snouts. Like spinners, blacknose sharks prefer warmer temperatures and are plentiful throughout the summer in shallow nearshore waters and estuaries along North Carolina's southern coast. Another visitor, the silky shark (*Carcharhinus falciformis*), can be found closer in to the shore from May to December.

Raging Bull One of the most feared sharks near or inshore, the bull shark (*Carcharhinus leucas*), migrates here from Florida and arrives off the Carolina coast in June. Likely named for their heavy, stout bodies and short, rounded snouts, bulls can exceed 10 feet in length. They can be found on offshore shoals and shipwrecks but also along the beach throughout the summer. Most remarkably, these large predators frequent shallow bays, inlets, sounds and rivers and have a world-famous tolerance for fresh water. Bull sharks have navigated the Mississippi River as far north as Illinois, have ventured 2,500 miles up the Amazon into Peru and are even common in Lake Nicaragua, a freshwater lake in Central America. In North Carolina, they've been spotted in the Northeast Cape Fear River above Wilmington, the New River near Jacksonville and the Neuse River above New Bern.

"They're very common around the Emerald Isle Bridge in late July and August," according to Schwartz. "They're also there on the Cedar Island flats in summer. The 6-and 8-footers come swimming into knee-deep water and scare the scallopers away."

Because of their preference for very shallow coastal waters, bull sharks are considered some of the most dangerous sharks. Throughout the world they have a reputation for aggression and are often identified in attacks on swimmers. They've earned their reputation largely because they have more opportunities to interact with humans than do other species. They are one of the few coastal sharks that will readily go after big prey such as sea turtles, other sharks, large rays and even dolphin. According to Schwartz, bull sharks are probably responsible for many of North Carolina's recorded human attacks.

Other common sharks that move inshore in early summer include scalloped hammerheads (*Sphyrna lewini*), sandbar sharks (*Carcharhinus plumbeus*) and lemon sharks (*Negaprion brevirostris*). Each of these species is known to enter estuaries and coastal rivers in July and August. Schwartz has tagged and tracked two distinct populations of hammerheads, one group that migrates here from Florida and another that moves offshore in winter and back again in summer. Sandbar sharks are abundant along the Carolina coast and can be found on display at all three N.C. Aquariums. Lemon sharks, named for the yellowish color of their skin, move close to shore as water temperatures rise. Large ones over 8 feet long have been caught in very shallow water in Masonboro and Core sounds.

Schwartz knows the hot spots for other species as well. "In late July and August, you can go to Fort Macon and find lots of young nurse sharks (*Ginglymostoma cirratu*). They're cream colored, with pretty bright blue spots. If you go to Hammock's Beach at Bogue Inlet in November, you can regularly see 10-foot thresher sharks (*Alopias vulpinus*) close to shore, in 20 feet of water or less."

Far beyond the beaches and inlets, many of the sharks found close to land also frequent offshore areas. As long as the waters stay warm, sharpnose, blacktip, spinner, sandbar, scalloped hammerhead and bull

sharks are common. Out near the Gulf Stream, large tiger sharks (*Galeocerdo cuvier*) and great hammerhead sharks (*Sphyrna mokarran*) are sometimes seen. The dangerous tiger shark ventures near shore as well. Like bull sharks, tigers are feared around the world and can swim into North Carolina rivers, especially the Cape Fear near Southport. A whopping 1,150-pound tiger shark was caught on Yaupon Beach Pier in 1966.

The Life Aquatic Scuba divers from around the world come to the waters off North Carolina's coast to explore the diverse animal life and historic shipwrecks. Increasingly, they're interested in diving with the offshore population of sand tiger sharks (*Carcharias taurus*) found on popular wrecks such as the *Papoose*, a 412-foot tanker that rests 30 miles southeast of Morehead City. Sand tiger sharks (not to be confused with tiger sharks) are brownish-gray sharks with rows of protruding teeth and are abundant south of Cape Hatteras and over wrecks throughout the year. Though menacing in appearance, they are not aggressive toward divers.

"Nearly half of the calls we receive are from people wanting to dive with sharks," explains Robert Purifoy, operator of Olympus Dive Center in Morehead City. "We don't need to feed or bait them, unlike other dive destinations that offer shark diving. They're just there."

Most of the sand tigers Purifoy sees are in the 4-to-8-foot size range, though some may exceed 10 feet. It's not uncommon for his dive parties to find themselves surrounded by 20 to 40 sand tigers. He has also witnessed a population increase over the years. "In the late 1980s we saw a few sharks on the *Papoose*, *Proteus* and *Tarpon*. In the early 1990s we saw more sharks on these same sites, and around 2000 we started seeing more sand tigers on other wrecks. Today, we have sharks on every site and regularly see sharks on wrecks that did not have them 20 years ago," says Purifoy.

The Living Sea There is debate, however, about the overall health of shark populations in North Carolina. Less than 30 years ago, commercial longliners were plentiful, and shark tournaments were common. Some think years of fishing led to the decline of some species, and in the 1990s, federal and state regulators restricted shark landings on commercial and recreational catches. Today, North Carolina's commercial shark fisheries have declined, and recreational fishermen generally are limited to possession of one shark that must exceed 54 inches. Many species are illegal to possess at all.

"The fishermen are convinced that the populations are better off than the models say," according to Fritz Rohde, biological supervisor with the N.C. Division of Marine Fisheries. "The fishermen are seeing a lot of sharks, but the research is suggesting the numbers are down."

Schwartz sees natural fluctuations in his ongoing shark study. "For the last two or three years we have not seen very many bull sharks, but before that we saw lots of them. Until the last few years we saw few hammerheads, and now we're up to our armpits in hammerheads. These are natural cycles that wax and wane, and declines are not necessarily from overfishing."

It may be comforting to know that most of us will never confront a shark in the surf or tangle with one offshore. For regular swimmers and boaters, the risk of attack is incredibly small. Perhaps it's fortunate that the large number of sharks that visit the Carolina coast each summer do so largely under the waves, out of sight. We're happy to give them all the space they need.

Jay Barnes, director of the N.C. Aquarium at Pine Knoll Shores, is author of "North Carolina's Hurricane History" and "Florida's Hurricane History" (UNC Press).

SAND TIGER SHARK

~ Shark Attacks ~ in North Carolina

Thanks to movies and sensational news stories, shark attacks have become high-profile fears for many people. The truth is that shark attacks, especially in North Carolina, are exceedingly rare.

About 60 shark attacks are recorded worldwide each year, fewer than 10 of which are fatal. North Carolina has 29 verified attacks and seven fatalities from 1870 through 2007. In the United States, the risk of death from lightning is about 30 times as great as that of death by shark attack.

Still, it's useful to know what the risks are and how to minimize them. Water temperature near the beach is a key factor, as most shark attacks occur during summer when ocean temperatures rise above 80 degrees Fahrenheit. Murky water may also play a role, since bites are often cases of "mistaken identity." Research suggests that most North Carolina attacks have occurred in afternoon during ebbing tides and during periods of full or new moon. Other advice to minimize your risk: Don't swim in early morning or late evening when sharks are feeding; don't swim near inlets; avoid wearing light or brightly colored swimsuits; and stay out of the water if you are bleeding.

The most recent fatal shark attack in North Carolina was during Labor Day weekend in 2001, when a 28-year-old swimmer was killed by a bull shark at Avon. The fatal attack immediately prior to that was almost 45 years earlier. On July 15, 1957, a man was killed while swimming in the surf at Salter Path. Other fatalities occurred in Ocracoke Inlet in May 1945, at Onslow Beach in September 1935 and at Davis Shore in Carteret County in July 1905.

WHAT HAVE YOU DONE TO *my kitchen?*

WRITTEN BY PETER MEYER | ILLUSTRATED BY GREY BLACKWELL

Twenty-five pounds of octopus meat, a gourmet kitchen and two eager cooks—it seemed like a good idea at the time.

"How do you cook octopus?" B.K. asks me on the phone. His voice is eager with excitement.

"I'm not sure," I reply. "Why?"

"I've got 25 pounds of octopus here, that's why. We've got to figure out a way to cook it."

"I'll be there in 10 minutes."

Sure enough, B.K. has 25 pounds of octopus there in his luxurious waterside home, where panels of glass overlook green marsh and the sparkling water of the Intracoastal Waterway. The kitchen inside mirrors the elegant abode. B.K.'s better half, Joanie, is a gourmet chef, and she's set up a kitchen modern enough to pass for the galley on the *USS Enterprise* in "Star Trek."

Joanie's a neatnik, too—she keeps her fancy cookhouse spotless and organized, every spoon and saucer in place. In retrospect, Joanie's modern mess hall is perhaps not an optimal setting to unleash two fully grown (albeit perhaps not fully mature) men intent upon learning how to cook octopus.

Nevertheless, B.K. is primed: A gleeful smile spreads over his face as he rubs his hands together in anticipation. He slides a Mozart CD into the kitchen sound system. "Creative music for culinary geniuses," he explains. We begin our epicurean endeavor by lifting a few octopi out of a giant red cooler, which B.K. has strategically located in the middle of the shiny tile kitchen floor. We hold the octos at arms' length, inspecting them.

Fascinating creatures, these most intelligent of animals without backbones. Along with squid, they're labeled cephalopods, meaning "head-foot" animals. An apt name, as octopi are all head and feet, with the head connecting directly to eight long tentacles. Their mottled skin is covered with a clear slime, and the ink from their internal sac oozes forth and mingles with the slime. Some people might call them ugly or grotesque, though they're beautiful by my reckoning.

Beautiful or not, these marine marvels are slippery and hard to handle. B.K. and I manage to drop several of them on the kitchen floor before we even turn on a burner to cook. "Just wipe up the slime with paper towels," B.K. says. "We'll clean the floor better when we're done."

"Yes, boss," I tell him. I'm just following orders. It's his kitchen, isn't it? Or, at least he's married to the woman whose kitchen it is, and that makes him responsible, not me.

The actual cooking starts simply enough. We throw a couple of octo-oddities into a pot of boiling water. "We'll show the Italians and Japanese how Americans jiffy-cook octopus, won't we?" I profess. Mere minutes later, my tone changes: "Kind of pungent, eh?"

"Better get the room deodorizers and spray down the kitchen," says B.K., pinching his nose with his fingers. While we're spraying odious deodorizers in a futile attempt to cover up the stink of cooked octopus, brown foam from a boiling pot somehow spills out onto the stove top and floor. We flail away briefly with fluffy white bath towels appropriated from a nearby bathroom before realizing the mess will take a white tornado to clean up. "Leave it. We'll use some heavy-duty cleaner later," B.K. says. I nod my head solemnly in agreement. At least we have two octopi fully cooked, ready for us to extract sweet and tasty octopus meat.

Cutting the skin and suckers off a boiled octopus reveals itself to be a formidable task—comparable to cutting the tread off an automobile tire with a pocketknife. It's almost impossible. An hour passes before we separate 2 inches of octopus meat from the skin and suction cups of even one tentacle.

Frustrated but determined, B.K. and I press onward. We bake, steam, broil and microwave octopi. We marinate, baste, parboil and beat the eight-armed bandits, trying to find the optimal cooking method.

Our efforts produce a rapidly expanding mess in the kitchen, but little in the way of edible meat. Whatever the method used, the skin and tentacles of the octo-beasties stick to the inner, white meat like bubble gum to hot pavement. B.K. hangs his head, a beaten man, a look of exasperation on his face. "I don't think it's worth it," he mumbles. I am beginning to wonder myself.

Fortunately, a light bulb flashes above my head. "I've got an idea!" Quick as a wink, I'm on the phone to Gail Miller, an educator with the N.C. Aquarium at Fort Fisher. "I've heard that pressure cooking is the way to cook octopus," Gail offers. "I've never tried it myself, but reliable people tell me it works."

By this time, the only pot or pan in Joanie's formerly gleaming kitchen that isn't filthy is the pressure cooker, and we bring it up to temperature pronto. Faster than you can say more and more

mess, the pressure cooker, too, has remnants of red skin pigment and black ink scorched onto its lining.

But, oh, have we found the key! The skin and suckers slide off the octopus meat as easy as wiping oil off a dipstick. And what fine meat—pure white morsels of flesh, delectable, just like shrimp or scallops. "Let's celebrate," says B.K.

He pops the tops off two cans of beer and hands one to me. B.K. yanks the Mozart CD and slides in music from "The Big Chill." He cranks up the volume on "I Heard it Through the Grapevine." Spontaneously, we begin an octopus-cooking dance, slipping and sliding around the tile floor.

Ol' B.K. is prancing with a beer in one hand and fingers of white octopus meat hanging from his other hand. He's proud as a strutting peacock displaying its feathers. We had worked for that meat, by golly! As we slip-slide around the dance floor, we fail to notice a pertinent event—the arrival of the Kitchen Queen, Joanie.

Two steps into the kitchen, Joanie freezes in her tracks. Her nostrils flare as the pungent odor of cooked octopus assails her nose. Her steely eyes scan the dirty counters, floors, pots, pans, knives and cutting boards. A look of horror transfixes Joanie's face—she apparently doesn't appreciate the enormous efforts we have made to produce the shards of meat hanging from her husband's clenched fingers.

Joanie's dismay is understandable. Her kitchen now resembles the galley on a pirate ship. "What have you done to my kitchen?" she demands.

B.K. and I stand motionless, locked in place by the if-looks-could-kill, we'd-be-corpses expression on Joanie's face. "Would you like to taste an octopus tentacle, dear?" B.K. manages. "They're delicious."

"I'll wrap my tentacles around your throat if you're not out of my kitchen in five seconds," Joanie answers. Despite her diminutive 5-foot, 3-inch size, the tone of Joanie's voice renders her threat entirely credible. I quickly excuse myself and slip out the back door, allowing B.K. to bear the brunt of Joanie's scorn and derision. B.K. tells me later that he scrubbed, cleaned and polished the rest of the afternoon. Two months passed before Joanie allowed him back in her kitchen unattended.

Still, our octo-cooking foray was productive. Our trial-and-error adventure proved that pressure-cooking is the best way to prepare a tasty octo treat. Time and time again, we have extracted delicious octopus meat via the pressure cooker method. Only now, we cook them outside on the camp stove—not in Joanie's kitchen! ◆

Peter Meyer will sample anything out of the ocean that is even rumored to be edible. He is a physician living in Wilmington.

Octopus Preparation

If you happen to be at the coast, the best way to obtain octopus to cook is by purchase from black sea bass fishermen. These fishermen use wire cages, resembling crab pots, to trap sea bass. Octopi are an incidental bycatch in the pots. Seafood markets carrying black sea bass can also obtain octopus for customers. If a seafood outlet does not normally carry octopus, the proprietor can sometimes obtain it by special order. The inland supply of octopus meat is often limited to Asian, Greek and Italian specialty markets.

Like other seafood, octopus should be kept cold until cooking. Prepare the octopus by making a cut underneath the eyes, separating the tentacles from the head. Discard the head and internal organs. The tentacles are ready for cooking.

Set up a camp stove outside if possible because the cooking process can get a bit smelly. Fill a pressure cooker up to one-third full with octopus; add one-quarter cup of water. Add 1 teaspoon of cooking oil to prevent foaming and liquid spilling out the top of the pressure cooker. Cook for 15 to 20 minutes after the top begins to jiggle.

Cool the cooker under cold, running water. Hold a tentacle in one hand and peel the skin and suckers away from the meat, using the thumbnail on the opposite hand as a fulcrum.

What remains is a beautiful, long finger of octopus meat, tasty and nutritious. The snow-white strands can be used in virtually any seafood recipe. The meat is a bit tough compared with shrimp or scallops, but chopping or grinding the meat solves this quandary nicely.

How do octopus suckers work?
See Nature's Ways, page 39.

Throughout human history they have been grown, worshipped, worn, carved, painted, eaten, stored and bartered.

Here come the Sunflowers

written by Helen Correll / illustrations and nature activity by Anne M. Runyon

Sunflowers. What image comes to mind when you read that word? For most people, it is the towering garden sunflower, *Helianthus annus*, with its super-sized bloom. The common garden sunflower is the most familiar sunflower in the world.

North Carolina has 20 native perennial sunflowers as well, but unlike *Helianthus annus*, the plants have not been super-sized. Instead you may find branching, leafy plants covered in 2- or 3-inch yellow blooms, or naked and graceful stems showing off a select few blossoms.

NAMING THE SUN

All sunflowers belong to the genus *Helianthus*, which comes from the Greek words helios (sun) and anthos (flower). In Greek mythology, Helios was the god who pulled the sun across the sky with his chariot, drawn by four winged horses.

Sunflowers are also members of a family of composites, or plants whose flower heads look like a single flower but are really many smaller flowers growing atop a platform called the receptacle. The tiny center flowers, called disk flowers, are crammed together on the platform. Around the edge of the platform is a ring of ray flowers that have one long petal. Other composites are black-eyed Susans, asters, daisies and coneflowers.

WOODLAND SUNFLOWER (*Helianthus divaricatus*) is a common perennial that grows from long, thin rhizomes in dry woods, open areas and roadsides. It blooms June through August. American Indians brewed tea with the roots of this plant to be given for colds, coughs or bronchitis.

SMALL WOOD SUNFLOWER (*Helianthus microcephalus*) or small-headed sunflower is a dainty flower that grows from long rhizomes in woodlands, roadsides and pastures in the Mountains and Piedmont of North Carolina.

THIN LEAVED SUNFLOWER (*Helianthus decapetalus*) is also called forest sunflower. It is common in dry upland woods, but rare in the Coastal Plain. American Indians made a poultice from the roots of this plant to put on skin sores.

ANNUAL VS. PERENNIAL

The super-sized *Helianthus annus* is called an annual because its long taproot lives for only one year. A plant sprouts from seed in early spring, blooms from June through October, sets seed in the fall and then dies with the first frost. North Carolina's native sunflowers are perennials, which means they have roots that stay alive for more than one year. The tops die away in winter, but the roots continue growing underground. A new plant sprouts from the old roots in the spring. Some perennial sunflowers grow from a fibrous root system, others from rhizomes or tubers.

JERUSALEM ARTICHOKES (*Helianthus tuberosus*) grow from knotty tubers in rich and damp places like ditches, stream banks or low roadsides. American Indians called them sunroots, or sunchokes, and used them as root vegetables long before explorers from Europe arrived in the New World. Traders named the flower Girasole, (jeer-ah-so-LAY) which is Italian for "sunflower." Girasole gradually turned into Jerusalem. The traders thought it tasted somewhat like an artichoke. You can still find Jerusalem artichokes in market stalls throughout the world, and even in some grocery stores in North Carolina.

MAXIMILIAN'S SUNFLOWER (*Helianthus maximilianii*) is named after Prince Maximilian of Wied, a German explorer and naturalist who traveled through the United States in 1832–1834. Its 3-inch flowers grow on unbranched stems up to 10 feet high. This sunflower grows in moist roadsides and disturbed areas.

TO BE OR NOT TO BE ... A SEED

When you buy sunflower seeds as snack food or bird food, the packages are clearly labeled exactly that: "sunflower seeds." In fact, they are not seeds. They are achenes, (ah-KEENz) a type of dry fruit produced by many flowering plants that contains a single seed that nearly fills the fruit walls (or pericarp) but does not stick to it. Acorns are achenes produced by oak trees.

HAIRY WOOD SUNFLOWER (*Helianthus atrorubens*) is a common sunflower in North Carolina. The plant has large basal leaves and a few tiny leaves on the branches that are hardly noticeable. The disk flowers of these plants are purplish red. This sunflower grows well in dry soils and is found throughout North Carolina on woodland edges, roadsides and pastures or old fields. It is sometimes known as Appalachian sunflower.

SWAMP SUNFLOWER (*Helianthus angustifolius*) is one of the most common sunflowers in our state. It grows from a fibrous root system in the Coastal Plain, Sandhills and lower Piedmont of North Carolina. It has stiff and narrow leaves and inch-long ray flowers set off by dark purple disk-flowers. The plants bloom from July until frost. This plant doesn't mind growing in wet soil, but it also grows in drier, upland sites. Another name for this plant is narrow-leaf sunflower.

SCHWEINITZ'S SUNFLOWER
(*Helianthus schweinitzii*) named for botanist Lewis David Von Schweinitz, is a flower associated with the old Piedmont prairies. Early explorers and traders in the New World wrote of finding many such prairies in the Piedmont of what is now North Carolina. The prairies were maintained by regular burning (either naturally occurring wildfires or controlled fires set by American Indians) and the grazing of large animals such as buffalo. The Schweinitz's sunflower is now found in only a few locations in North Carolina, including Union, Stanly, Cabarrus, Mecklenberg and Rowan Counties, usually on roadsides or powerline rights-of-way where the plants are mowed regularly. The small flowers bloom from Late August through October. It is on the federal list of endangered plants.

SUNFLOWER CAFE

Sunflower achenes can be roasted, toasted or baked with a sprinkling of salt and served as a wholesome snack. They are a good source of protein, fiber, vitamin E, zinc and iron.

Crunch! Crunch! Who doesn't like to munch potato chips? Next time you do, read the bag. Chances are it will say: "Now cooked in sunflower oil." Because it is high in vitamin E and low in saturated fats, cooking in sunflower oil helps make potato chips a healthier snack. (But, what's new? American Indians have used the oil on their skin and hair, and for medical uses, for over 3,000 years.)

Another way to eat sunflower seeds is to grind them into sunbutter, a peanut butter substitute.

White-tailed deer like to nibble the new growth of the native sunflowers in spring and summer, as well as feast on the flower heads once blooming begins. Many small mammals eat the seeds.

And don't forget the birds. Northern bobwhites, mourning doves and songbirds such as goldfinches, Carolina chickadees, dark-eyed juncos and white-throated sparrows enjoy the smaller seeds of native sunflowers.

dry leaf of *Helianthus schweinitzii*

Archaeologists report that American Indians of the southwest states cultivated sunflowers more than 3,000 years ago.

Get Outside

Begin a wildflower collection by pressing wild sunflowers. You'll need a heavy book such as a dictionary, sheets of newspaper or construction paper and a small pair of scissors or clippers. Take a walk outside and look carefully on roadsides, forest edges and old fields for bright yellow rays of sunflowers.

With your scissors, cut one bloom and one leaf from the plant. Be careful not to cut any more than you need, or damage the plant in any way. Take the flowers home and immediately put them between pages of the heavy book. The newspaper or construction paper should be folded on either side of the flower to help absorb moisture and protect the book. Leave the flowers in the book for about three days.

Mount the dried flower in a scrapbook with a drop or two of glue. Use a field guide or the illustrations from this article to identify your sunflower. On the page, write the name of the flower, where it was growing and the date.

Remember: National and state parks forbid the picking of wildflowers.

Read and Find Out

- "Eyewitness Books: PLANT" by David Burnie, Alfred A. Knopf, 1989.
- "A Child's Book of Wildflowers" by M. A. Kelly, Four Winds Press, 1992.
- "Wildflowers: Science & Nature Guides," World Book, Inc, 2005.
- "Wildflowers: National Audubon Society First Field Guide" by Susan Hood, Scholastic, 1998.

In *Wildlife in North Carolina:*

- "State Fair Sunflowers" by Clyde Sorenson, October 2003.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

How many animals can you find in this grassland?

In the 1700s, Schweinitz's sunflowers bloomed in North Carolina's Piedmont prairies. Now they are an endangered species.

Bison, white-tailed deer, bobwhites, grasshopper sparrow, field sparrows, monarch butterflies, Eastern black swallowtail butterfly, American lady butterfly, small yellow butterfly, dotted skipper butterfly, bumblebee, mining bee, bee fly, spur-throated grasshopper, two-striped grasshopper, green lynx spider, tick and lady beetle.

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

There's Good News Despite Record Low Landings

State commercial harvests of several key fish and shellfish species edged up in 2006, despite an overall decrease in commercial fishing trips. The shrimp fishery ended a three-season downward trend in 2006, and oyster harvests increased for the fourth consecutive year. "These are two important commercial fisheries to North Carolina, and it is encouraging to see them doing better," said Louis Daniel, director of the N.C. Division of Marine Fisheries.

Overall landings for shellfish, shrimp and crabs rose as well, finishing 9.5 percent above 2005 harvests. A mild winter helped fishermen bring 5.7 million pounds of shrimp to the docks, more than double the 2005 landings and right in line with the previous five-year average.

Fewer incidents of oyster disease and increased production from Pamlico and Topsail sounds and the North River may be the reason oyster landings have risen consistently from 46,082 bushels in 2002 to 84,585 bushels in 2006. Hard blue crab harvests went up in 2006 by 803,684 pounds from 2005, but were 25 percent lower than the previous five-year average.

Yet the decline in fishing trips and the lack of a traditional menhaden fishery took a toll. Overall landings for fish and shellfish hit an all-time low for the second year in a row. Taking menhaden out of the equation, overall landings were up 1.2 percent in 2006. Seafood brought to North Carolina docks in 2006 totaled 68.6 million pounds, an amount nearly 14 percent lower than in 2005.

Finfish catches (without menhaden) were down 5 percent from 2005 and 15 percent from the previous five-year average, although catches increased for some managed species such as Southern flounder and red drum. However, not all finfish catches were down. It was a good year for speckled trout, tilefish and yellowfin tuna.

The total value of the commercial harvest increased by $5 million to $70 million. The number of commercial fishing trips decreased from 155,112 in 2005 to 149,721 in 2006.

Blue crabs, with a dockside value of $17 million, remained the state's top dollar seafood, followed by shrimp in the No. 2 spot, with a $9 million value.

JODY DUGGINS / NCWRC

COMMERCIAL

BY POUNDS LANDED

1. Blue crab	25,309,539
2. Atlantic croaker	10,383,561
3. Shrimp	5,736,305
4. Summer flounder	3,966,148
5. Bluefish	2,791,100

BY VALUE

1. Blue crab	$17,065,194
2. Shrimp	$9,141,172
3. Summer flounder	$8,418,033
4. Southern flounder	$4,870,780
5. Atlantic croaker	$3,558,280

Recreational catches in North Carolina remained stable in 2006, according to the Marine Recreational Fisheries Statistics Survey. Anglers caught nearly 12 million fish in 2006, weighing a total of 25.5 million pounds. By weight, yellowfin tuna topped the recreational catch at 7.6 million pounds. By number of fish, anglers caught more spot—2.7 million—than any other fish.

RECREATIONAL

BY POUNDS

1. Yellowfin tuna	7,645,118
2. Dolphins	5,578,864
3. Striped bass	2,112,024
4. Bluefish	1,207,241
5. King mackerel	1,114,458

BY NUMBER

1. Spot	2,698,081
2. Bluefish	1,119,792
3. Dolphin	679,066
4. Kingfishes	669,412
5. Spotted seatrout	562,897

A complete list of landings for 2006 can be found on the Division of Marine Fisheries Web page at www.ncfisheries.net.

Clayton Angler Lands Record Channel Cat

DUANE RAVER/USFWS

After nearly two years, North Carolina has an official state record channel catfish. John Davinson of Clayton reeled in a 16-pound channel catfish from the Roanoke River in April to fill the empty slot in the record book.

The old state record, held by Maryville, Tenn., angler Pete Paine since 1971, was decertified when a photograph in the May 2005 issue of *Wildlife in North Carolina* revealed that the fish Paine caught from Fontana Lake was actually a flathead catfish, a species that grows much larger than the channel cat. After the photograph was published in the article "The Ones That Didn't Get Away," several astute readers wrote to the magazine, pointing out the error.

Paine's record was established prior to the N.C. Wildlife Resources Wildlife Commission administering the State Record Fish Program, and commission biologists were not given the opportunity to verify the species. The N.C. Division of Travel and Tourism administered the program until the mid-1980s, when the commission took over.

The Wildlife Commission now requires anglers seeking state-record certification for freshwater fish to submit with their applications a full, side-view photo of the fish. Additionally, anglers must catch their fish on hook-and-line only, weigh the fish on certified scales and have the fish examined by a qualified expert from the commission.

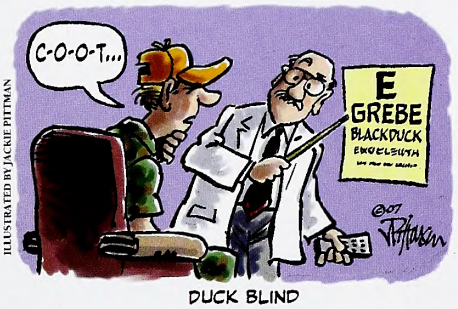
Davinson's fish was weighed on certified scales in Roanoke Rapids and was verified as a new state record by Kirk Rundle, a commission fisheries biologist. The channel cat, which Davinson landed on a golden shiner minnow, measured 32 1/2 inches in length and 19 1/2 inches in girth.

For a list of all freshwater fish state records in North Carolina or more information on the commission's State Record Fish Program, visit www.ncwildlife.org.

ON PATROL

While working duck hunting on Veterans Day, Master Officers Anthony Cox and Marshall Myers checked two duck hunters who proudly exclaimed that they had enjoyed a good day of hunting. The men held up their bag of two birds, which they claimed were coots.

Cox told the hunters that they did have a good day, but one of the birds was a black duck and the season was not yet open on that species. Officer Myers took the other bird and told the hunters that bird was a grebe, which was a protected species. The next statement from one of the hunters was, "I didn't kill it. I didn't kill it!" The second hunter slowly raised his hand and claimed both birds.



ILLUSTRATED BY JACKIE PITTMAN

DUCK BLIND

Public Access, Education First CRFL Projects

The first money spent from Coastal Recreational Fishing License sales will go toward a public fishing access project and a marine resources education project.

The N.C. Marine Fisheries Commission and the N.C. Wildlife Resources Commission have agreed to spend $200,000 from the N.C. Marine Resources Trust Fund to design a proposed Chowan River fishing pier at the old bridge site on U.S. 17 near Edenton. Also, the two commissions approved $100,000 for a new saltwater angler's field guide.

"I am very pleased with the close working relationship we have developed with the Wildlife Resources Commission, and I'm excited that we can fund these projects that are of such interest to both agencies," said Louis Daniel, director of the Division of Marine Fisheries.

The Wildlife Resources Commission and the Division of Marine Fisheries are working jointly with Chowan County and the Town of Edenton to improve an existing boat ramp at the Chowan River Bridge and turn the old highway bridge into a fishing pier with bathrooms and possibly a pier house.

"The development of an accessible fishing pier and renovation of the boating access area at the Chowan River site are critical to providing access to quality fishing in the Chowan River," said Bob Curry, chief of the commission's Division of Inland Fisheries. "This project demonstrates how state resource agencies can work together with local governments to improve recreational opportunities for all anglers."

The Division of Marine Fisheries is also putting together a full-color pocket field guide that will be available free of charge to fishermen. The guide will include summaries of the state's saltwater fishing programs, descriptions of the most popular recreational fish and the habitats in which they live, and information on how we need to have healthy fish habitats to have healthy fish populations.

Fishing access and public education is one of three program areas the Wildlife Resources Commission and the Marine Fisheries Commission have adopted as priorities for license funding. The other two areas are fisheries research and habitat enhancement.

Forbush Takes Another State Hunter Safety Title

Perennial contender Forbush High School of Yadkin County won its 10th championship at the North Carolina Youth Hunter Safety Tournament in late April (see "Straight Shooters," May 2007). The Forbush Blue team edged Perquimans High School 3,050–3,034. South Stanly (3,025) placed third, Pisgah (3,004) fourth and West Davidson (3,001) fifth among the 32 teams competing in the Senior Division. The Forbush Red team finished eighth. The tournament was the last for longtime Forbush coach David Moxley, who is retiring.

In the Junior Division, Fall Creek earned the team, beating Jones 2,959–2,903. Forbush (2,896) took third, followed by Farmville (2,818) and Albemarle (2,805). Fall Creek also is in Yadkin County.

Austin Warner of West Montgomery won the Senior Overall title with 778 points, finishing six points ahead of Barron Lane of Perquimans and 11 in front of Ryan Stanley of the Surry Gold squad.

Forbush's Tyler Testerman (753 points) took the Junior title, with Ethan Pendry (744) of Fall Creek second and Kyle Smith (742) of Jones third.

Held at Millstone 4-H Center near Ellerbe, nearly 300 competitors representing 52 teams took part in the tournament held by the N.C. Wildlife Resources Commission. The daylong event attracted an estimated 1,500 spectators.

Students 12 and older tested their accuracy in rifle, shotgun, muzzleloader and archery, and navigated an orienteering challenge armed with only a compass. Outdoors and hunting safety knowledge were measured through a written exam.

"These are the best competitors from nine district tournaments," said Capt. Chris Huebner, hunting safety coordinator for the commission. "Who wins here helps determine which teams go to the national Youth Hunter Education Challenge in New Mexico."

Competition is open to teams from middle and high schools, both public and private, that offer hunter safety education courses. Home-schooled students and teams representing organizations such as 4-H or Future Farmers of America also can compete in the tournament provided they meet eligibility requirements.

While the Youth Hunter Safety Tournaments are for students ages 18 and under, the Wildlife Resources Commission offers free Hunter Education Courses in all 100 counties on a regular schedule. Successful completion of the course is required for all first-time hunting license purchasers in North Carolina.

Courses are taught by Wildlife Enforcement Officers and hunter education instructors, with information about hunter responsibility, wildlife conservation and management, firearms, wildlife identification, survival and first aid, specialty hunting, and tree stand safety. Visit www.ncwildlife.org for the availability of courses.

IN SEASON

This month, this season is open in North Carolina:

Crow: Wednesday, Friday and Saturday of each week, plus Labor Day, Thanksgiving and Christmas each week through Feb. 29.

Check the *2007–2008 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

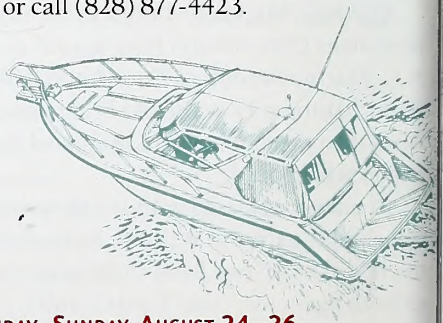
CALENDAR OF EVENTS

Saturday–Sunday, August 11–12

See the latest in guns, knives and other outdoor gear at the Dixie Gun & Knife Classic at the Jim Graham Building on the N.C. State Fairgrounds in Raleigh. Visit www.dixiegunandknifeshow.com.

Saturday, August 18

Try your hand at fishing in the Basics of Fly-Fishing course at the Pisgah Center for Wildlife Education in Pisgah Forest near Brevard. Instructors will cover such topics as equipment, knots, casting techniques and aquatic entomology. Equipment and materials provided. Limited to eight participants ages 16 and over. Visit www.ncwildlife.org or call (828) 877-4423.



Friday–Sunday, August 24–26

Check out the latest in boats at the Carolina Fall Boat Show & Sale at the N.C. State Fairgrounds in Raleigh. Visit www.ncboatshows.com.

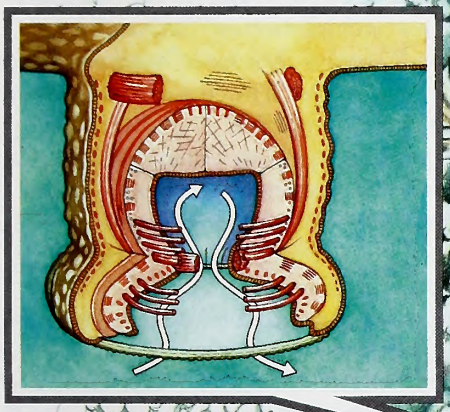
Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

How Do Octopus Suckers Work?

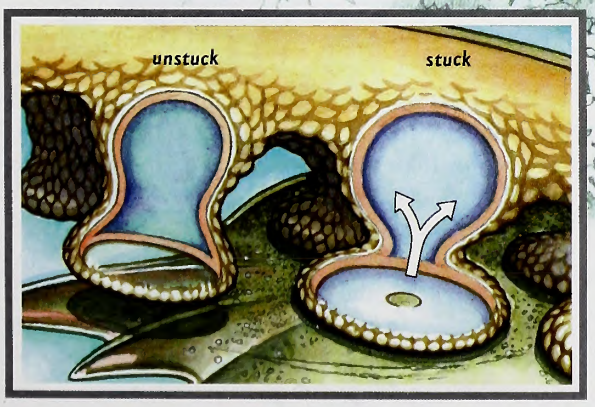
written by Clyde Sorenson
illustrated by Jim Brown

WAY BETTER THAN THE SUCTION TIPS on toy arrows, the suction cups on its tentacles allow an octopus to hold on to almost anything, including slippery, slime-covered fish or hard, prickly crabs. Simple in appearance, each is actually a sophisticated grabbing tool. Should the stuck object try to pull away, the negative pressure increases, actually holding the object more firmly.

Each sucker is composed of two muscular chambers linked by a narrower canal and open to the water. "Unstuck," both chambers contain water, and water flows freely in and out of them.



The rubbery edge of the sucker disc ensures a complete seal with the object. Tiny ridges on the edges dig into the object and keep the sucker from sliding around on the object once it's acquired.



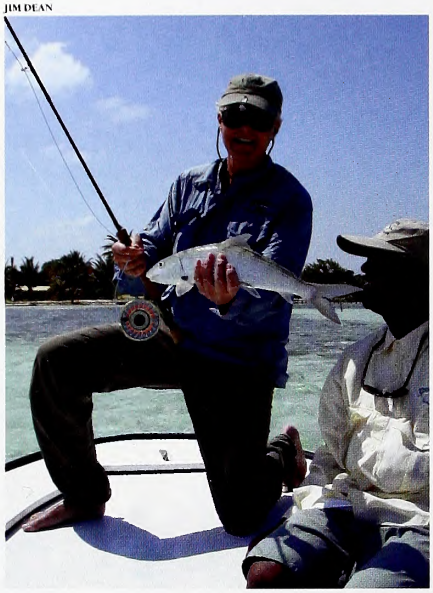
When the edge of the sucker disc makes complete contact with the object, a fixed pool of water is trapped in the two chambers. Upon contact, a band of muscle near the canal between the two chambers contracts, forcing the water from the outer chamber into the inner chamber, making the inner chamber expand (much as you can make the end of a party balloon expand by squeezing it) and creating the negative pressure that sticks the sucker to the object.

Rank Fish

written by Jim Dean

Here's food for thought if you're at work and looking for some diversion, or otherwise monumentally bored. Did you know that there are fishermen who believe that status among their peers—and possibly their intelligence—can be measured on a scale sort of like a thermometer? Instead of degrees of heat, the units of measurement are species of fish ranked in the order of their perceived worthiness. This is adjusted by the techniques anglers choose to catch them, and more recently it has been further modified so that extra points are awarded to any angler who has no intention of keeping and (sad to say) eating the fish.

JIM DEAN



Bonefish on a fly

Here's the way it works. Among freshwater fish, the various trout species (rainbows, browns, brookies and other trout) are arguably at the top. Next you might expect to find muskellunge, smallmouth bass, largemouth bass and walleyes. Northern pike and pickerel contend with a host of sporting panfish such as bluegills, shellcrackers and crappies, trailed distantly by catfish, carp, suckers, eels and (my vote for the most miserable freshwater species of all) the green sunfish.

"Assessing the worthiness of other anglers we encounter is in our DNA."

Keep in mind that these choices are somewhat subjective, because I have surely overlooked other worthy candidates that are your personal favorites. Never mind; the theory still holds.

When you add saltwater species, most of us would rank permit, bonefish and tarpon somewhere in the upper tier. These would be closely followed by blue marlin, sailfish, swordfish, tuna and their ilk (with extra credit if they aren't caught trolling). Then you have red drum, sea trout and a mid-range mélange of mackerel, flounders, snappers, sheepshead and bluefish, followed by a large contingent of nondescript bottom-feeding species pursued mostly by casual surf fishermen on family vacation. I doubt anyone will disagree that the least desirable saltwater candidate is the ubiquitous pinfish (the saltwater equivalent of the green sunfish).

Of course, you can't overlook anadromous species that live in the oceans and ascend rivers to spawn in fresh water. These include salmon, sea-run trout (again those rainbows, browns and brookies that are so inclined), stripers and shad. Indeed, all anadromous species tend to rank high, and the Atlantic salmon may easily rank number one over all other species in the opinions of elite anglers (and what, if anything, is this list but elitist?).

As mentioned, you must then factor in how these various species are caught. Fly-fishing would likely lead the list, followed by bait-casting and spinning with lures, bait-fishing with any hook and line, trolling, trot-lining and/or jug fishing, snagging, noodling (catching by hand), spearing, poison, dynamite and heaven knows what else.

We could go international with this, but then we'd have to include the British fascination for catching minnows and other mostly minuscule species using maggots and similarly disgusting baits. And there's that Asian business of fishing with tethered live cormorants that dive for fish and return them (like an English setter on a check cord) to their hosts, being prevented from swallowing their catch by choke rings on their throats. Hard to rank any of that.

You may say that determining a valid ranking would seem an impossible task, and it would be—except that every fisherman is born with an instinctive mastery of the concept. Assessing the worthiness of other anglers we encounter is in our DNA.

This is merely a variation of the ancient assumption that *The fishermen in the next boat are no good.* "They're bass fishermen," the musky or trout enthusiast will remark disdainfully. "He's using worms," we sniff as we cast our artificial lures. Or "He's using lures," we sniff as we cast our flies. No doubt you can substitute your own insult, and do so with the easy certainty that anyone fishing with you will understand and agree. The business of one-upmanship is an innate and accomplished art form among all anglers.

I am as guilty of this as anyone else. This past May while fly-fishing in the presence of friends, I caught a large brown trout. (Witnesses are cherished because they eliminate the need to fashion an outright lie later.)

You would think I would be satisfied with this good fortune. Get serious. Several times that evening, the subject of my brown trout arose, and not always because I happened to mention it. Yet each time the subject was reintroduced, I felt obliged to note that I had caught this trout using a size 22 midge on a 3-pound tippet. Why? Obviously, some primal need forced me to enhance the accomplishment.

The truth is that my magnificent trout was caught accidentally while the line was dragging in the current between casts—a fact that I neglected to mention. This suggests that intelligence may not be part of the equation; otherwise, I wouldn't be admitting it now.

N.C. Wild Store

Raleigh, Pisgah Forest, Corolla, online and in *Wildlife in North Carolina* magazine

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Recently completed centers for wildlife education in Corolla and Raleigh join the Pisgah Center near Brevard to put Wild Stores in all three geographic regions of North Carolina.

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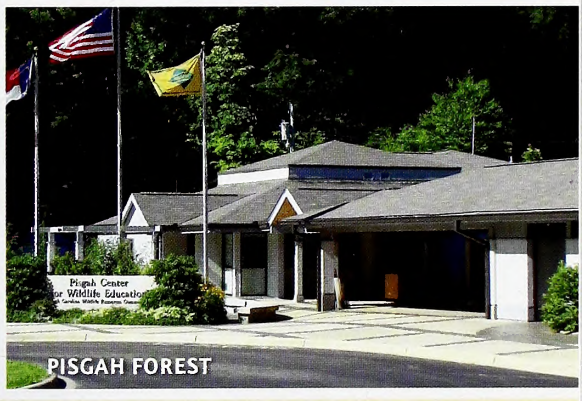

Store hours 8 – 4:30, 7 days
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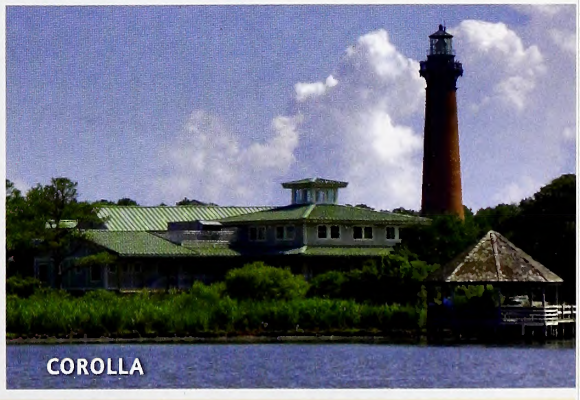

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A

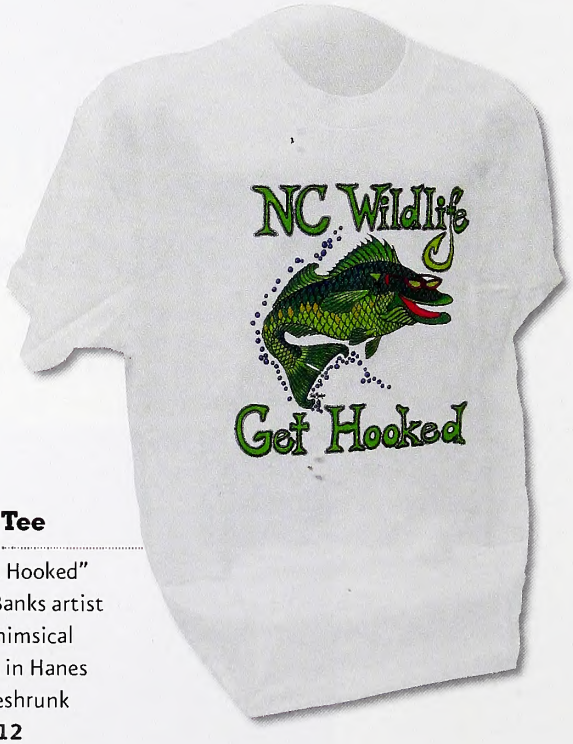
B

C

Wild Ones Caps

Wild Ones caps feature a maximum-detail embroidered wildlife scene on the side and "NC Wildlife" tone-on-tone embroidery on the front. 100% brushed chino fabric and adjustable Velcro back. **$20**

A. TROUT CAP Product Code: **DIR10111**
B. BASS CAP Product Code: **DIR10115**
C. MALLARD CAP Product Code: **DIR10114**



Get Hooked Tee

NC Wildlife "Get Hooked" tee with Outer Banks artist Kim Mosher's whimsical largemouth bass in Hanes heavyweight preshrunk 100% cotton. **$12**

Product Code: **DIR10013**
Youth Size: XS (2–4)
S (6–8), M (10–12), L (14–16)

Ladies' V-Neck Sport Shirt

Our prewashed, presoftened sport shirt cut for women. Exclusive "NC Wildlife" design embroidered on Harvard Square 100% extra fine combed cotton. Stylish V-neck, rib collar and cuffs. The exclusive "NC Wildlife" design has 12,000+ stitches. **$28**

RED	Product Code: **DIR10025**
WHITE	Product Code: **DIR10027**
CAROLINA BLUE	Product Code: **DIR10026**

Size: S, M, L, XL, XXL

1-866-WILDSHOP

Men's NC Wildlife Black Shirt

Exclusive "NC Wildlife" design embroidered on luxurious 100% Peruvian Pima cotton. Adjustable cuffs, locker loop, back pleat, button down collar. **$45**

Product Code: **12259**
Size: M, L, XL, XXL, XXXL

Adult White NC Wildlife Tee

Our silk-screened pocket tee with "NC Wildlife" front and exclusive design on the back is a Hanes Beefy-T in heavyweight preshrunk cotton. **$18**

Product code: **DIR10050**
Size: M, L, XL, XXL, XXXL

NC Wildlife Ladies' Tee

Relax in our white "NC Wildlife" silk-screened shirt cut especially for women. The 100% heavyweight cotton tee has a narrow ribbed collar, double-needle stitching and shoulder-to-shoulder tape. **$14**

Product code: **DIR10057**
Size: S, M, L, XL, XXL

Adult Navy Tee

A pocket tee with silk-screened "NC Wildlife" front and exclusive design on back. Hanes Beefy-T on heavyweight 100% preshrunk cotton. **$18**

Product code: **DIR10051**
Size: M, L, XL, XXL, XXXL

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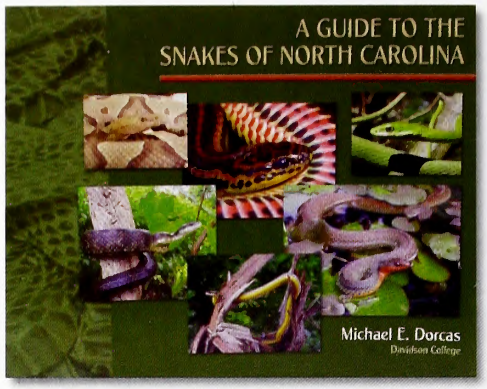
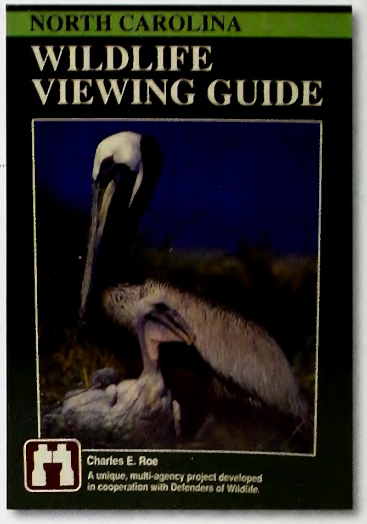


Guide to Snakes of N.C.

This 42-page book features more than 150 color photographs and descriptions of the 37 non-venomous and venomous snakes in North Carolina. It explains the important role snakes play in the state's ecosystems, describes snake conservation efforts, and answers commonly asked questions such as "Do snakes chase people?" and "Are snakes slimy?" **$8.95**

Product Code: **DIR10032**



N.C. Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, this color guide will lead you to 90 of the state's premier wildlife viewing locations and improve your chances of seeing wildlife once you get there. **$8**

Product Code: **12227**

Dogs That Point, Fish That Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* magazine between 1978 and 1995. **$22**

Signed copies shipped to first 50 orders while supplies last.

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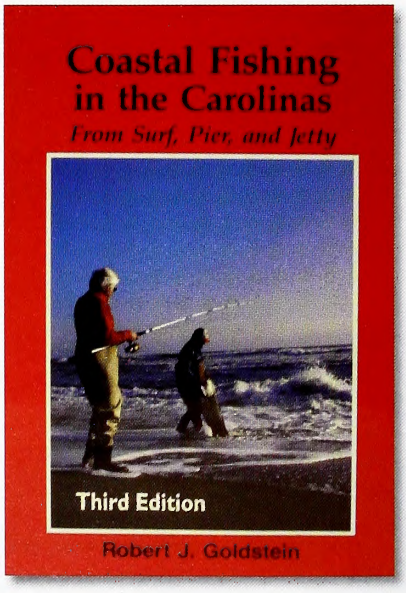
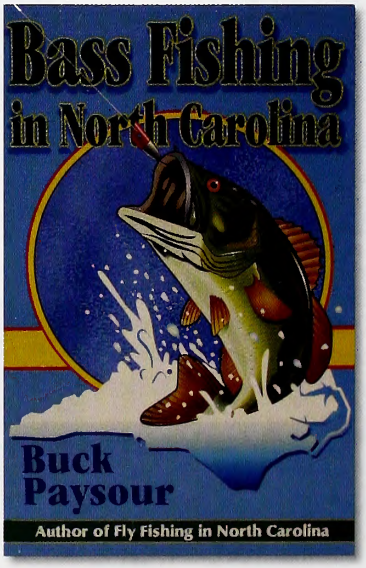


Coastal Fishing in the Carolinas from Surf, Pier, and Jetty

Whether you enjoy angling from surf, pier, groin, bridge or jetty, Robert Goldstein's *Coastal Fishing in the Carolinas* equips you with saltwater savvy, from selecting rod and tackle to determining the right times and the locales for the best catch of the day. With amusing anecdotes and tips from seasoned locals. **$15.95**

Paperback, 243 pages, black-and-white photographs, pen-and-ink drawings, maps, charts, appendixes, index

Product Code: **12201**



Bass Fishing in N.C.

North Carolina is a bass fisherman's paradise, and nobody knew more about the subject than Buck Paysour, who fished the state's waters for more than half a century. Details the major waters for largemouths and smallies. Tips from Buck and professional guides about where to fish, where to put in your boat and which lures to use. **$14.95**

Paperback, 244 pages with black-and-white photographs, appendixes, index

Product Code: **DIR10071**

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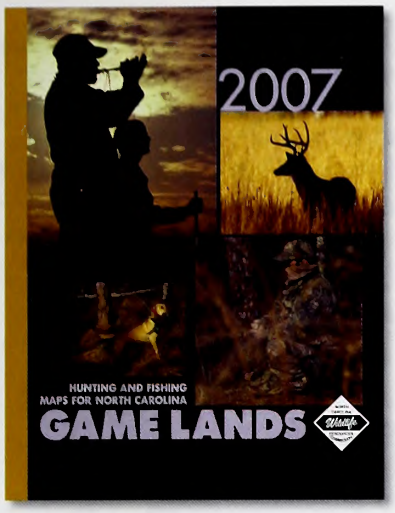
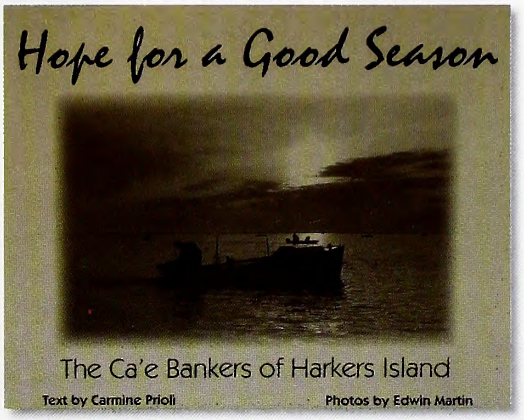


Hunting and Fishing Maps for North Carolina Game Lands: 2007 Edition

For hunters, trappers and fishermen, maps of two million acres of North Carolina game lands. Updated in June 2007. Shows game species present, special hunt opportunities, disabled accesses, camping areas, geographic features. **$10**

Product Code: **DIR10143**



Hope For a Good Season: The Ca'e Bankers of Harkers Island

Harker's Island was home to a band of fishermen and whale hunters until modern times brought drastic change, tourists and high prices. The Harkers natives who cling to tradition are featured in this book about a vanishing way of life. **$15.95**

Paperback, 119 pages, with black-and-white photographs

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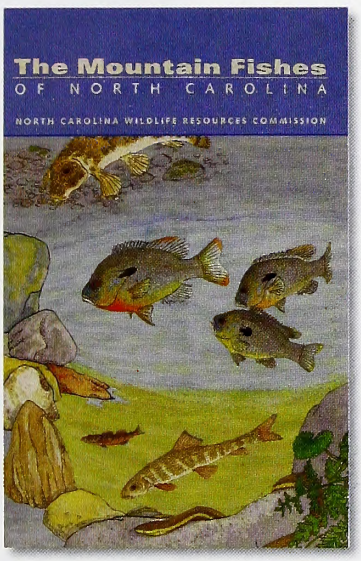
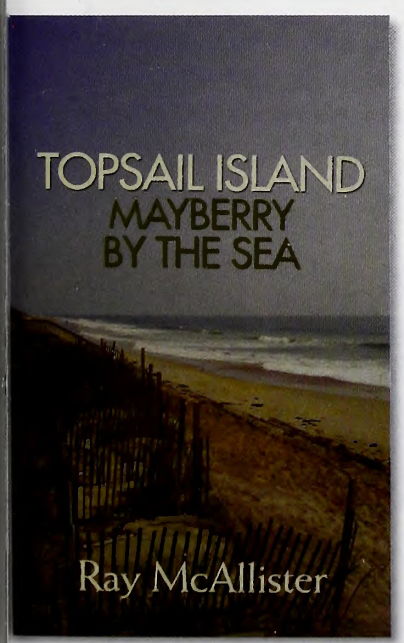


Mountain Fishes of N.C.

This booklet describes habitat, range, diet, breeding and identification of 44 freshwater fish species that occur in our state's cold, fast-running streams. **$3**

Product Code: **12249**

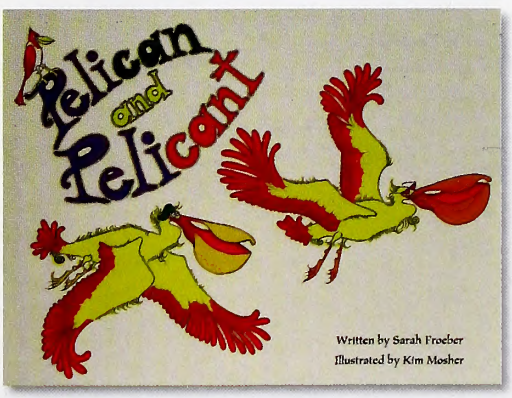


Topsail Island: Mayberry by the Sea

After a week-long vacation on Topsail Island, Ray McAllister wrote a newspaper column about the place where everyone goes 10 miles per hour under the speed limit. It brought a deluge of responses from readers who shared his appreciation for Topsail, providing the inspiration for this book. **$12.95**

Paperback, 228 pages, with 40 black-and-white photographs

Product Code: **DIR10058**



Pelican and Pelicant

Although they have similar names, telling these two charming beach birds apart is easy: One is eager and self-confident, the other nervous and shy. Sarah Froeber's tale is delightful and engaging, while Kim Mosher's illustrations are simple yet detailed. **$20**

Hardback, 39 pages

Product Code: **12211**

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Convertible Bag/Blanket

Quickly converts from a bag to a blanket or seat cushion for picnics, camping and sporting events. Water-resistant Softex™ polyester backing keeps blanket clean and dry. Bellowed zippered front and back pockets. Adjustable shoulder strap, snap closure. Plush Horizon fleece 60"x 50" blanket has anti-pill finish. Exclusive embroidered design. **$42**

Product Code: **DIR10036**

Executive Book Light

Catch up on reading late into the night or while traveling. Exclusive "NC Wildlife" design and stainless steel bookmark clip. Gift box, batteries included. **$7**

Product Code: **DIR10095**

Umbrella

This mini umbrella has an easy manual operation and a carrying strap. A nylon pouch is also included for convenient storage. **$12**

Product Code: **DIR10078**

Journal and Pen

Contemporary 5"x 7" journal has aluminum cover with exclusive "NC Wildlife" design, 100 sheets spiral-bound lined paper, leather back, elastic pen loop, elegant pen. **$18**

Product Code: **DIR10028**

Personal First Aid Kit

When you're enjoying outdoor activities, it's a good idea to be prepared with a first aid kit. Ours is a 5"x 3½" zippered pouch with clip. Includes: 4 vinyl bandages, 2 snip bandages, 2 antiseptic towelettes, 2"x 3" adhesive pad, first aid cream, 200 mg ibuprofen. **$5**

Product Code: **DIR10077**

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant. $275
  (under 1 year old—Applicatian must be received before applicant has attained 1 year af age.)
- ☐ Sportsman Youth $350
  (ages 1 thraugh 11—Applicatian must be received before applicant has attained 12 years af age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & traut waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents anly age 12 or older—includes basic hunting & inland fishing, big game, game lands, traut & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes caastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus caastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ Lifetime Magazine Subscription to *Wildlife in North Carolina* $150
(Please allow up to 6 weeks for your subscription to begin.)

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

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Make checks payable to: *Wildlife Endowment Fund*

A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

GRAINGER MCKOY JEWELRY

North Carolina-born sculptor Grainger McKoy's stunning sculptures of birds are highly prized by discriminating collectors around the world. His extraordinary gift of breathing life into wood, bronze and precious metal is unequaled — and now transfused in fine jewelry. Each piece begins as a small wood sculpture before it is cast and finished . . . bearing the unmistakable mark of his genius.

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Dove Feather Lapel Pin

1¼" tall, sterling silver.
$66

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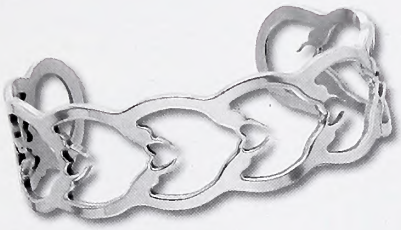

Skimmer Bracelet

Black Skimmers reflected in water, sterling silver.
$150

Product Code: **DIR10101**

Feather Earrings

Omega back, sterling silver.
$165

Product Code: **DIR10074**

Quail Cuff Links

Pivoting finding lies flat, sterling silver.
$175

Product Code: **DIR10076**

Carolina Wren Feather Earrings

¾" wide, sterling silver.
$125

Product Code: **DIR10073**

Recovery Stroke Pin

Named for the wing beat.
2⅝" tall, sterling silver.
$160

Product Code: **DIR10075**

Print Tiles by Kim Mosher

Outer Banks artist Kim Mosher's bright, 8"x10" ceramic tiles, framed in lightweight coquina foam.
13"x15" overall. **$59.95**

A. SPECKLED TROUT ATTACK
Product Code: **DIR10124**

B. CLOWN TRIGGERFISH
Product Code: **DIR10125**

Three ways to order

- Online: (by credit card) visit www.ncwildlife.org
- Telephone: (by credit card) call 1-866-WILDSHOP (1-866-945-3746)
- Mail: complete this form and mail with check, money order or credit card information (or fax to 919-707-0294).

Name: _____

Ship To Street Address: _____

City | State | Zip: _____

Phone: _____ E-mail Address: _____
(optional)

Billing Address _____
(if paying by credit card and different from ship to address above)

City | State | Zip: _____

Product Name	Product Code	Size	Quantity	Price Each	Total

Subtotal:	
Shipping:	no charge to U.S. address*
N.C. residents add 6.5% sales tax:	
Total:	

MasterCard VISA

If paying by credit card
Credit card number: _____
Expiration date: _____
Name on card: _____

If paying by check or money order, make payable in U.S. dollars only to Wild Store
Additional contact information
Local Phone: 919-707-0393 E-mail: storemanager@ncwildlife.org

Send with payment or credit card information
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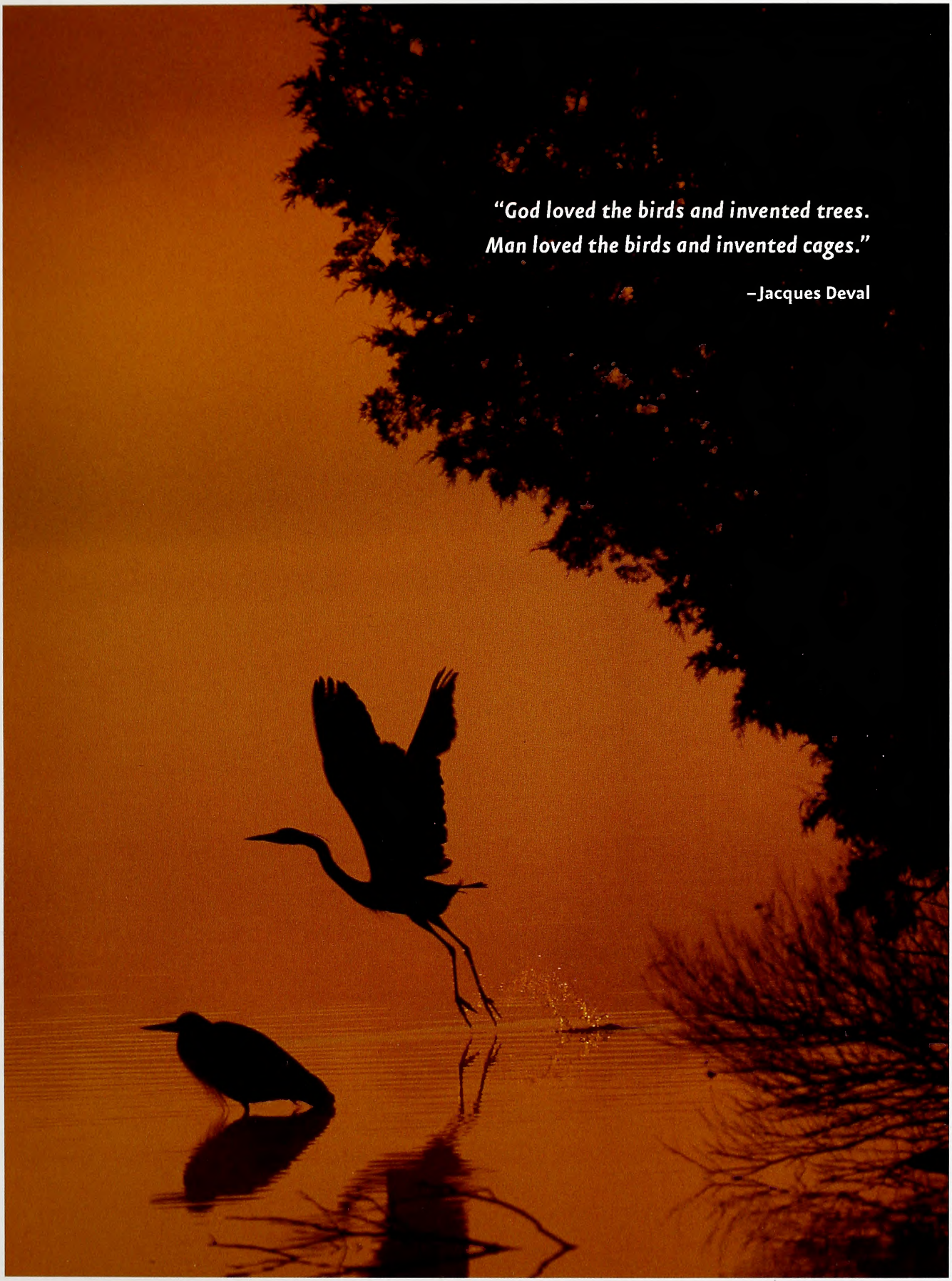

F. EUGENE HESTER

Great blue herons

OUTDOOR MOMENT

IN THE SEPTEMBER ISSUE

MELISSA McGAW

HOT DOGS

Bird dog field trials don't get any better than the ones held at the Sandhills Game Land in Hoffman.

COOL WHIP

North Carolina's longest and fastest snake, the coachwhip, dislikes being studied but is charming all the same.

QUIVERING TO HUNT

Early-season bowhunting for deer can be successful and fun if you know how to handle heat, insects and prey.

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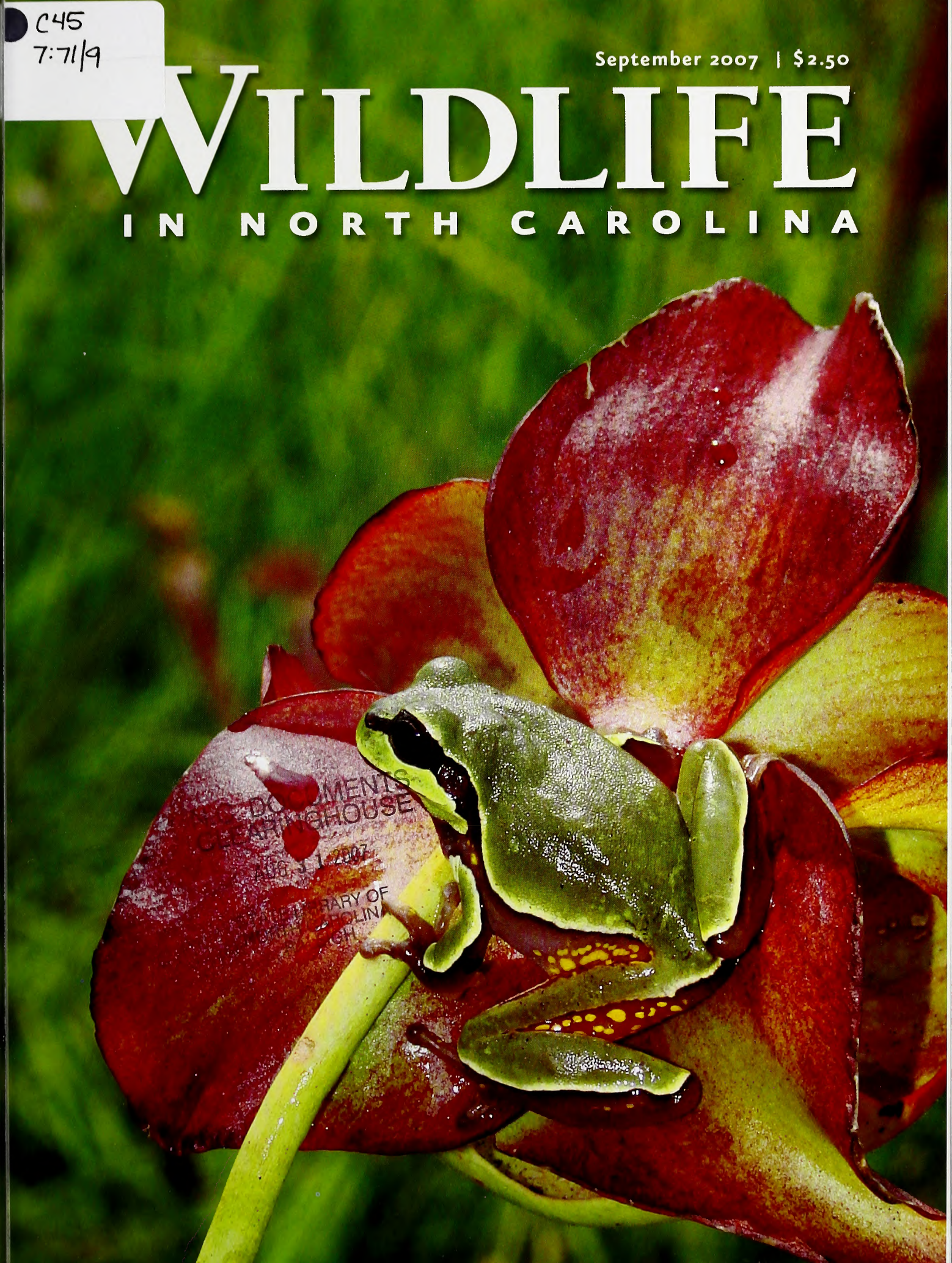
September 2007 | $2.50

WILDLIFE IN NORTH CAROLINA



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For several decades, riders on horseback have followed the action of bird-dog field trials held at the Sandhills Field Trial Grounds in Hoffman.

PHOTOGRAPH BY MELISSA MCGAW.

Volume 71 | Number 9

WILDLIFE IN NORTH CAROLINA

contents | september 2007

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8 **COACHWHIP DIARY**
written by Jeff Beane | photographed by Todd Pusser
North Carolina's longest and fastest snake doesn't appreciate being studied. When a naturalist sets out to learn its secrets, he learns other more important lessons.

14 **A NEW TWIST ON AN OLD THEME**
written by Michael O. Humphries
photographed by Melissa McGaw
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Cover: The pine barrens treefrog, which is found in the Coastal Plain, is a priority species in the N.C. Wildlife Action Plan. PHOTOGRAPH BY AUBREY M. HEUPEL.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

Versatility is a wonderful thing. The ability to move easily from one task or activity to another, especially in the outdoors, can result in a world of good times. But as people age, we tend to lean toward specialization rather than versatility. Many animal and plant species specialize too, surviving through the years and eons by finding an ecological niche and hunkering down in it. We don't often face the long-term survival issues that concern wild animals, so we can pick and choose our habitat, food, clothing and, most importantly, our recreational activities.

RUSSELL A. GRAVES

The age of "The Old Man and The Boy," in which a young Robert Ruark became skilled at stalking everything from deer to ducks to rabbits to quail to squirrels, has been gone for decades. Most outdoors enthusiasts try a few different types of hunting and then settle on one or two pursuits they enjoy. Perhaps they enjoy the camaraderie of dove hunting or the solitude of waiting for deer in a tree stand. Or maybe the thrill of the hunt is gone, and now, busting clay pigeons is big fun. It could be that their guns are locked in the safe to stay and a fishing rod is their weapon of choice.

There's nothing wrong with being a specialist. Some folks would argue that it is the only way to become really skilled at anything. That could be why a jack of all trades is master of none. Specialization is only natural. However, versatility is more fun.

Managing editor Michael O. Humphries shows us this month in "A New Twist on an Old Theme," (page 14) how versatility in the hunting fields can be accomplished with just one weapon. Many outdoorsmen have owned a trusty old shotgun that was used for several different types of hunting. Mike explains that with one flexible weapon and the proper ammunition, you can hunt almost any game animal in North Carolina. And here's the clincher: You can do it on a fairly small budget.

So even if you aren't currently a hunter, check out Mike's story and consider getting out there. There are a ton of great hunting opportunities available in this state—especially if you are versatile.

Greg Jenkins

Greg Jenkins

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Cute and Delicious

I just finished reading "Fox Squirrel Tales" in the July issue. While the pictures were first-rate, I would have enjoyed the article much more if it had contained some information regarding hunting tactics for this game animal. I was eagerly anticipating this article from the time I had seen the "teaser" for it on the back cover of the June issue. I had simply assumed it would include useful information such as comparing hunting tactics for fox squirrels to gray squirrels. It would also have been nice to read about North Carolina game lands where fox squirrels can be found, and perhaps even a recipe or two. As a hunter I was very disappointed by this article.

Lou Mallia
Raleigh

We're sorry the piece did not meet your expectations, Lou. The current distribution of the fox squirrel in North Carolina, and the regulations governing the harvest of the species, make it an increasingly infrequent target of hunters. The fox squirrel may be hunted in two mountain counties (Alleghany and Ashe) and 21 counties in the Coastal Plain and Sandhills (Anson, Bladen, Brunswick, Cumberland, Duplin, Edgecombe, Greene, Harnett, Hoke, Johnston, Jones, Lenoir, Moore, New Hanover, Onslow, Pender, Pitt, Richmond, Sampson, Scotland and Wayne). The daily limit is one and the season limit 10 in a fairly short season between Oct. 15 and Dec. 31. One of the most common hunting takes of fox squirrels is when an outdoorsman kills one while hunting for a different animal such as rabbits or gray squirrels. If you want to have a good chance at harvesting a fox squirrel, try Sandhills Game Land, Bladen Lakes State Forest Game Land or Suggs Mill Pond Game Land.

I Beg to Differ

May I suggest you rename your publication? *Wildlife in North Carolina* just doesn't work anymore. Change it to *Hunting and Fishing in North Carolina*. That would be a better match for the direction the magazine has taken.

Roland Price
Raleigh

Because regulating and managing hunting and fishing in the state are the responsibility of our parent agency, the N.C. Wildlife Resources Commission, we will continue to cover hunting and fishing in the magazine as we have for the 71-year history of the publication. We will also continue to cover natural history, conservation and nonconsumptive outdoor recreation, just as we have for more than seven decades.

Dove Alternative

Having enjoyed the thrill of opening day of dove season for more years than I care to remember, I was excited when a friend in nearby Mt. Olive and my mother told of sightings of ringneck doves. In early fall, my wife and I saw one while walking in the park. On a visit to Miami Beach in December, my wife and I saw the same ringneck doves daily in the Miami area. Imagine my surprise when in late spring we began to see two pairs of these doves actually nesting in the pines in our back yard. I was wondering if other readers have witnessed these beautiful birds and also as a longtime dove hunter, would this bird be included in bag limits in the future?

Bill Rose
Calypso

Bill, it sounds like the bird you are describing is actually the Eurasian collared-dove (Streptopelia decaocto), a non-native bird now documented as breeding across the state. The bird has a black collar on the back of its neck, is pale overall and the end of it tail is white when viewed from below. It is also bigger, more aggressive and more prolific than native mourning doves. This species is not protected by the federal Migratory Bird Treaty Act and is therefore covered solely under state regulations. North Carolina does not have a season on Eurasian collared-doves, so please hold your fire until you hear otherwise.

Oary Problem

I really enjoyed Bruce Ingram's article "Canoe Camping on the Cheap" (June 2007). There was plenty of good information not only on what to bring but why to bring it. I certainly fit the description of the target audience, being both an angler and a birder. I own two canoes and two kayaks and have paddled a lot of North Carolina waters from the swift to the placid. I had hoped that there would be some info in the article about where to go canoe camping. Most of our rivers traverse private property where camping is not allowed. A full-day paddle between two campsites is even more difficult to find. I sure would appreciate any info you can give on locations where one could enjoy canoe camping. Thanks for the great article and the always informative and entertaining magazine!

Robert Spencer
Kernersville

North Carolina's state parks offer excellent canoe camping: Check out Merchants Millpond, Eno River, New River, Pilot Mountain, Lumber River and Raven Rock (www.ils.unc.edu/parkproject). Other camping opportunities can be found on the Roanoke (www.roanokeriver.com), Broad, Dan, French Broad, Uwharrie, Yadkin and Neuse rivers. Bruce Ingram has many times walked up to a rural home to ask permission to camp in a riverside field. Promising to build no fires and leave no trash, rarely has he been refused permission. Visit www.carolinacanoeclub.org for details.

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SOME LIKE IT

KNOWING AVAILABLE FOOD SOURCES FOR DEER CAN BRING SUCCESS

WHEN BOWHUNTING IN THE HEAT.

HOT

WRITTEN BY BRUCE INGRAM

PHOTOGRAPHED BY RUSSELL A. GRAVES

When I was 7 years old, my parents took me to a drive-in movie theater, where we watched the 1959 classic "Some Like It Hot." Starring Tony Curtis, Jack Lemmon and Marilyn Monroe, the film takes its name from the scene in which Monroe, in that dreamy voice of hers, warbles that some like their jazz played hot.

I can't imagine Monroe shimmying up a tree stand to bowhunt—though come to think of it, maybe that wouldn't be such a bad thing to imagine—but I do know that there are many North Carolina bowhunters who live for the hot weather of the early deer season. With a season that begins in early to mid-September and is one of the earliest in the country, North Carolina sportsmen have to deal with a variety of heat-related situations.

HOT FOOD SOURCES

David Sawyer, the surveys and research coordinator for the N.C. Wildlife Resources Commission, lists some of the food sources bowhunters might want to hunt near when the season begins and on into October. "On the early end it's grapes, grapes, grapes," he says. "Then it's white oak acorns. Of course, apples are good if you have trees to hunt around."

The summer grape is common in much of North Carolina. It often ripens throughout the month of September and remains on the vine as "raisins" well into autumn. Summer grapevines thrive in dry woods and often are found on the edges of clear-cuts—prime places to position a portable stand.

White oak acorns are a whitetail food not only in North Carolina but also throughout much of the eastern half of the United States. Growing well in both dry and moist woods, the white oak tree features evenly lobed, rounded leaves; whitish gray, slightly furrowed bark and nuts with bowl-shaped cups that cover about one-third of the acorn.

When the white oak is dropping its nuts, I prefer to set up a portable stand near or within a grove and hunt this food source exclusively. The only problem with this hardwood is that it is a notoriously fickle producer of acorns, often generating a cornucopia of nuts one year but a sparse crop or no crop at all for the next few seasons.

Venison Care in the Heat

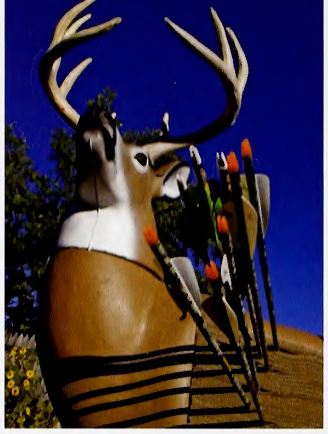
For successful hot weather bowhunters, a major concern is meat spoilage. When temperatures are in the 80s or 90s in September, a hunter needs to act quickly to impede bacterial growth after a deer is down. This requires a clean, efficient kill and proper care of the venison in the field.

The first way to cope with this problem — improving your shooting skills — requires action months before the season actually opens. I like to develop a preseason shooting regimen, beginning just after Independence Day, that involves shooting eight or nine arrows at a target about five times a week. An accurate shot, obviously, will bring down a deer more quickly.

Another preemptive step is to wait for the ideal shot, which means the whitetail is either standing broadside or quartering slightly away. A third step is for an archer to know his effective range. I limit all shots to 20 yards or less. I know that many hunters can shoot accurately at distances greater than that, but I know that I consistently cannot.

Once a sportsman has field dressed his whitetail and dragged it to a vehicle, it is imperative to bring the carcass to a meat processor or a butchering station as quickly as possible. The days of hunters toting their deer around on the hood or trunk of a car are gone, but I would encourage early season bowhunters to store a cooler full of ice packs in their vehicles. Place these ice packs within a black trash bag and then stuff the bag into the chest cavity of the deer.

Another plus is North Carolina's phone check system. When you kill a big game animal, simply call 1-800-I-GOT-ONE to record your harvest. For hot-weather archers, this system is a real plus because they can now bring a deer directly to a butcher instead of having to spend time looking for a check station.



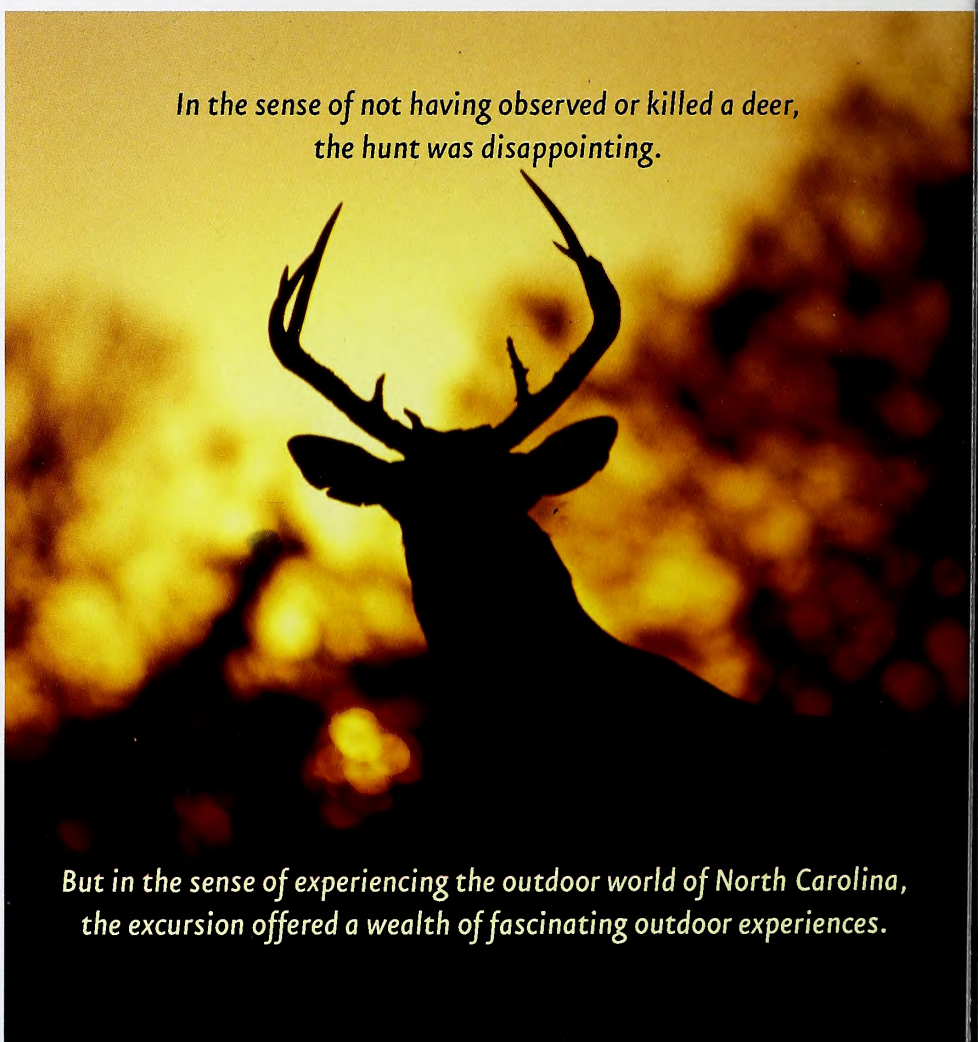
Shooting practice, appropriate clothing, insect repellent and stand site options can help make a hot-weather deer hunt a success.

In the latter situation, hunters should turn to other whitetail menu items. Evin Stanford, the commission's deer biologist, offers some appropriate possibilities. "Deer continue to forage on woody plants and forbs that have maintained palatability throughout the late summer and early fall," says Stanford. "However, a dry summer can stress such plants and make many of them lose their forage value. If some areas of our state luckily receive a fair amount of summer rainfall, the forage value of native woody plants and forbs may still be relatively high.

"Of course, corn and soybeans are agricultural crops that hunters should focus on as well. Soybeans may be palatable and desired by the deer for the first few weeks of the season, but they tend to dry up and lose their nutritional value quickly as the season progresses.

"Standing or waste corn can be a valuable food source throughout the late summer, fall and winter. As hunting season progresses into fall and winter, foods such as persimmons, wheat and clovers can provide excellent forage for deer. Acorns, though available during the early season, play a vital role in deer forage in some areas of our state throughout the fall and winter time periods, when food availability may otherwise be low."

The acorns that Stanford refers to include members of the red oak family, which are more consistent producers of hard mast. That's partly because there are so many species of red — and other — oaks in a variety of habitats in our state. For example, Northern red, scarlet, Northern pin, black, blackjack and turkey oaks all flourish here. Scarlet and black oaks thrive in dry soils, and pin oaks do well in moist bottomland habitats. Red oaks are a fairly adaptable species, growing well just about anywhere, whereas black oaks spring up in dry, barren soils. Look for turkey oaks in the sandy soils of the Coastal Plain.



Deer Heart Sandwiches

One of the traditional joys of pursuing any game animal is to express thankfulness for the harvest by eating some meat soon after the kill. That's one reason (the other is taste) that I like lunching on a deer heart sandwich the next day after I tag a whitetail.

In past generations, fresh, fried deer heart was a staple in North Carolina hunt club camps. Unfortunately, many hunters today routinely discard the heart. For both health and taste reasons, I don't like fried deer heart—I find it tough. However, cooked in a Crock-Pot, deer heart is a taste bud revelation.

Here's the recipe:

- Clean heart well, removing all blood vessels, then thoroughly rinse.
- Place heart in small slow-cooker with one 10 1/2-ounce can condensed cream of mushroom soup and 3/4 cup water.
- Cover and cook on low for eight to 10 hours.
- Slice meat thin and place between two slices of whole-wheat bread. Add mustard and several chunks of sharp cheddar cheese. Sweet white onion slices are optional.

As a group, red oaks produce acorns that require two years to mature, so nuts both 1 year and 2 years old can appear on the same tree. Red oaks also feature leaves with hairlike bristle tips, and the bark of many species is dark. Several decades ago, I purchased "A Field Guide to Trees and Shrubs," by George Petrides. This book is part of the Peterson Field Guide series, and it has been invaluable in helping me identify various species of white and red oaks, as well as many other trees.

Both Sawyer and Stanford emphasize that apples can be a real wild card during the early season. If this fruit is present and falling to the ground, deer can be counted upon to visit the area.

HOT STAND SITES

Last September, I met Kevin Hining, a commission fisheries biologist and avid bowhunter, for an outing on an Alleghany County farm. Kevin gave me three hot-weather stand site options for the Friday evening and Saturday morning we would have afield—sites that are typical of productive ones around much of the state. I could bowhunt on the edge of a field and next to a Golden Delicious apple tree that was dropping its fruit. Or I could try out a stand in a mixed white pine and red oak grove that had heavily used trails leading to it. Or I could put up a stand on a mountainous slope where red oak trees were shedding their bounty.

For Friday evening, I selected the field edge, hoping that the whitetails would find the apples to be to their liking. But for whatever reason, the deer failed to show up that evening. Feeling that the local whitetails would not be able to resist those large yellow apples for both an evening and a morning, I returned to the stand site on Saturday and once more learned that deer truly have minds of their own.

During the early season, I have often observed the deer moving around in the hours between 11 a.m. and 1 p.m., so just after 10 a.m., I abandoned the apple stand I had been in and moved next to the mixed white pine and red oak grove. Once again no deer showed, sending me home without having seen any whitetails at all during my visit to Alleghany County.

In the sense of not having observed or killed a deer, the hunt was disappointing. But in the sense of experiencing the outdoor world of North Carolina, the excursion offered a fascinating outdoor experience. Friday evening at sundown, a pack of coyotes serenaded me with their barks, howls and yips—a memorable and eerie experience.

Saturday morning, I twice witnessed a flock of 14 turkeys come by my stand. In between their appearances, I watched a cottontail wade a foot-wide stream that runs behind the stand site. The rabbit was intent on nibbling some form of vegetation. And during the four hours I was aloft in the tree, I tallied some 18 species of birds, including wood thrushes, catbirds, towhees, tufted titmice, Carolina chickadees and several species of migrating warblers. Adding to the birding experience was a ruffed grouse that drummed throughout the morning.

Marilyn Monroe was right in 1959, and she is right today. Some do like it hot. ◆

Bruce Ingram is a freelance writer living in Virginia. He contributes regularly to a number of outdoor-related publications.

How to Deal with Heat and Bugs

In the not-too-distant past, bowhunters had two options for dealing with the heat and bugs—light cotton clothing and smelly spray-on concoctions. Although cotton is justifiably known for its comfortable fit, it retains moisture and odors—both bad attributes for warm-season hunting clothing. And the smell of bug dope might have been good for warding off insects, but it also alarmed whitetails.

Fortunately, those not-so-good old days are gone. Today, bowhunters can choose from a variety of camouflage clothes made of carbon-based or other types of materials that severely reduce human odor. And a number of companies manufacture bug spray that either has no odor or comes in earth scent. Consult sporting-goods catalogues such as those from Cabela's and Bass Pro Shops for more information.

Coachwhip

North Carolina's longest and fastest snake is an animal that doesn't appreciate being studied.

written by
JEFF BEANE

photographed by
TODD PUSSER

THE COACHWHIP, *MASTICOPHIS FLAGELLUM*, IS A CREATURE OF EXTREMES. Extremely long (with a record length of 8½ feet, it's North Carolina's longest snake), extremely slender, extremely fast, extremely defensive when cornered or restrained, and extremely alert and active, often in extremely hot weather. Its visual acuity and intelligence rank high among North American snakes. It has an extensive overall distribution, including most of the southern United States and Mexico.

The seven recognized subspecies exhibit extreme color and pattern variation and occur in an extremely wide range of habitats. The nominate race, *M.f. flagellum*—the Eastern coachwhip—reaches the extreme northeastern edge of its range in southeastern North Carolina, where it inhabits sand ridges, high pine flatwoods, beach dunes and other dry, open, sandy habitats. Even an individual's coloration runs a gamut of extremes—North Carolina adults have coal-black heads and anterior bodies, grading to tan or beige toward their tails, with mostly white or cream-colored bellies.

In the Southeast, the coachwhip has suffered habitat loss and population declines along with other components of the decimated longleaf pine ecosystem. The N.C. Natural Heritage Program lists it as significantly rare, and its basic natural history is poorly known. In 1999, I became the first person to radio-track a coachwhip in North Carolina—not quite the sort of pioneer who becomes a hero in history books. The real hero (heroine, I should say) was just over 5 feet long and weighed 286 grams. Small as adult coachwhips go, she had a big story to tell.

19 March 1999: She's first captured basking near her hibernaculum—the site of a former stump with only a slight depression and inconspicuous hole in the ground remaining. I'd stumbled across the hole five years earlier and had since found several coachwhips, two Eastern hognose snakes, a pine snake and a corn snake using it.

24 March: Mike Dorcas also becomes a pioneer, performing North Carolina's first-ever coachwhip surgery at Davidson College. Snakes aren't built for external transmitter attachment; surgical implants are a virtual necessity. It's a simple procedure, but it requires proper tools, materials and expertise. The 5-gram transmitter goes inside the body cavity, the antenna wire extending forward subcutaneously. We use injectable anesthesia, but gas may also be used. Each has pros and cons. Injected anesthetic wears off slowly (five days pass before this female appears fully awake), but that allows for some healing before snakes become too active.

30 March: I release her down the hibernaculum. Maybe she'll dismiss the capture/surgery experience as a dream. Knowing the mobility potential of these snakes, I fear she'll immediately head for the next county a mile away and I'll never find her again. The small transmitter has limited range—half a mile, maybe, under ideal conditions.

My concerns proved largely unfounded. Though capable of long-distance travel, my subject ended up having a home range of roughly 45 acres with which she was intimately familiar. About half her territory was on the Sandhills Game Land, the other half on private lands that included two intersecting paved roads, old fields, a double-wide trailer home, the edge of a schoolyard and the ruins of a former school.

3 April: I track her for the first time. She's traveled about 124 meters, crossed a road and is basking on a pile of bricks and other rubble that was once the old school gymnasium. Later that afternoon, she's still there. This would prove to be her all-time favorite spot, where I would find her 20 times over 14 months.

10 April: I catch her briefly to check her condition and show her to an N.C. State University herpetology class on a field trip. I'll not touch her again for more than six months. Handling animals is stressful and alters behavior. Disrupting the behavior of telemetered animals defeats the purpose, so minimal disturbance is always preferable.

Diary

When a naturalist sets out to learn its secrets, he ends up learning more important lessons.

Whenever I see her, she's watching me.

Top: Mike Dorcas prepares to implant a radio transmitter in a coachwhip. Above right, the author marks the location of a coachwhip on Sandhills Game Land using a GPS unit.

Released, she retreats into a mostly filled-in culvert beneath a small, private paved road adjoining the main road. This would be another choice hangout, where I'd find her on seven subsequent occasions. Other refugia used repeatedly would include an inconspicuous hole by a firebreak, an old refrigerator door (beneath which I'd found other coachwhips previously) and a cotton rat burrow in an old field. I would also find her in various stump holes, beneath tin, along the schoolyard lawn or foraging in open woods or grassy fields. At each location, I record GPS coordinates in order to map her home range.

Seldom do I see her before she sees me. Coachwhips are wary, visually oriented snakes. Even if she's above ground, I might see only grass moving as she flees, or her tail disappearing down a hole. A coachwhip's common and scientific names (*Masticophis* means "whip snake," *flagellum* also means "whip") stem from its slender body and long tail, which, with its pale, dark-edged scales, resembles a braided whip. Folktales depict coachwhips thrashing victims with their tails, which are, of course, harmless. Like some other snakes, they often vibrate their tails when frightened, fueling such fallacies.

9 June: I fail to locate her signal, despite a long search in the intense heat. Subsequent visits still produce no signal. Had she moved far outside her "normal" home range? Did a hawk or other predator, or a human collector, carry her off? Had her transmitter been crunched by a predator? Crushed by a vehicle? Or had the battery simply failed prematurely, as often happens?

I continue to try each time I'm in the area. On 27 July, while driving through her territory at night, I pick up her signal again. I still don't know where she went during that seven-week period, but one possibility would later emerge. Meantime, she's back in her usual haunts.

4 August: She's down her cotton rat burrow. My flag from two months earlier is gone; I imagine the landowner removed it, wondering what it was for.

It's dog days now. Whenever I see her, she's watching me. A coachwhip's pupils are ringed with orange. Look one in the eye, and you'll see defiance incarnate. It could change you. I still

A coachwhip's pupils are ringed with orange. Look one in the eye, and you'll see defiance incarnate.

remember N.C. Natural Heritage Program zoologist Harry LeGrand's comment to me after spotting his first coachwhip: "What angry orange eyes!" I can feel those eyes on me when I'm tracking her. Even when she's underground, I suspect she's plotting against me. That I might have been in the sun too long is a no-brainer—five minutes is too long in this sun.

30 August, 1:45 pm: Hurricane Dennis is hammering the coast, but Hoffman is sunny and boiler-room hot as usual. Her transmitter is temperature-sensitive—it pulses faster at higher temperatures. I can calculate the transmitter's (and therefore the snake's) temperature by counting pulse intervals with a stopwatch and referring to a chart provided with each transmitter. As she melts into thick love grass just northwest of the school ruins, her body temperature is 102° F—the highest it's ever been and above the lethal range for some snakes.

5 October: Her signal is faint and frustratingly difficult to pinpoint. I finally determine that she's in a pile of old, discarded tin cans. The metal must be masking the signal; I dig into the pile briefly to make certain. As I casually toss aside a large coffee can, the signal disappears, and I realize she's inside that can—I've just thrown her several feet. There's only a small opening in the can, but she's in there, all right, in premolt. I pull a small loop of her body out and the signal intensifies—the can was blocking it. I carefully replace can and contents. I think about those cans of nuts with the trick spring-snakes inside.

I'd found her under other pieces of metal without any signal blockage, but for some reason—either the particular type of metal or the fact that it completely encased her—that coffee can seriously inhibited transmission. I'd later experience the same problem with two snakes that took refuge in a metal conduit. I now wonder if she might have been in this can, or in some metal pipe, earlier in the summer when I lost her signal. I'll never know.

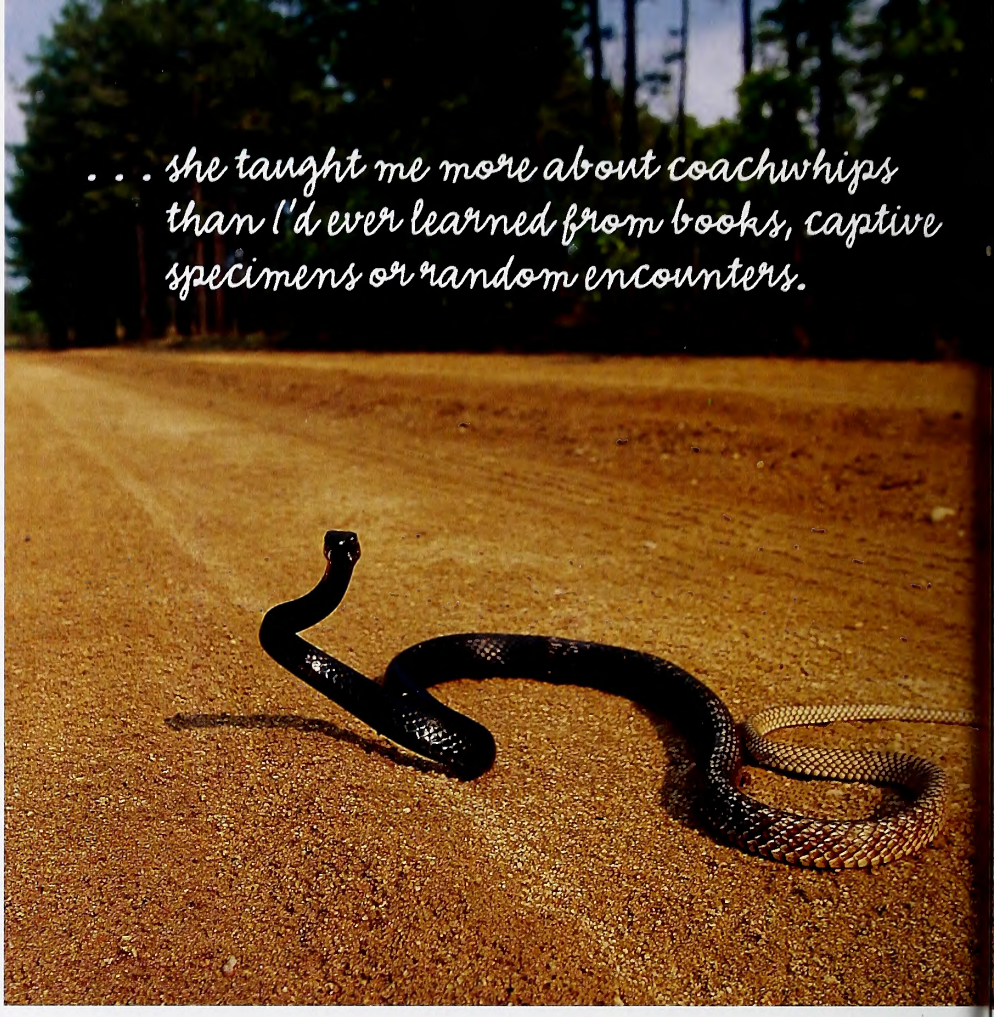
24 October: Noon; 56° F; she's down the hole she probably spent the previous winter in. Biologists call that hibernaculum fidelity, and it would be exhibited by several other snakes I would track later. I find her there on each of my next seven visits, but at 12:42 p.m. on 11 November, she's basking about 50 feet from the hole. It's overcast and 72° F. It's the last I'll see of her for more than three months.

January 2000: Record snowfall. She reposes beneath a white blanket; even my survey flags are covered. On 8 and 11 February, her body temperature reaches a record-low 39° F.

25 February: Noon; 70° F; she's looking up out of the hole. At 2:15 p.m., she's basking in dappled sunlight about 15 feet from the entrance. Her transmitter is rated for a year, its battery due to fail in less than a month. I'd prefer giving her more basking time to build up her immune system, but rather than risk losing her to a failed battery, I opt to bring her in.

21 March: She appears sufficiently healthy for another implant. We replace the old transmitter with a new one.

25 March: I release her back at the hibernaculum at 11:15 a.m., checking on her twice in the afternoon. On 7 April, after nearly six months,



she's back in her favorite spot in the school-gym brick pile. She spends this spring as a virtual replay of last year, visiting some of the same refugia that she clearly remembers.

11 June: I find her transmitter beneath a tall pine across the road from where she was found four days earlier in her favorite brick pile. Snakes occasionally manage to expel transmitters, but I don't think that happened in this instance. There are no remains or other proof of predation, but I suspect she met a raptor—most likely a red-tailed or red-shouldered hawk. A mammal might have chewed the transmitter and antenna wire and left more remains. Birds are more meticulous; I'd seen their handiwork on other telemetered snakes, from which the transmitters had been neatly extracted equally as well.

Having survived at least 29 paved-road crossings, she had probably fallen to natural predation. I'll never know for certain, but I envision her final stand punctuated by such repeated wild strikes as only a coachwhip can launch, mouthfuls of *Buteo* feathers snatched until she tired, a fatal blow fell and she was carried away.

There are risks in forming attachments. Bonds with wild things are no exceptions. Of all the snakes I'd known—captive and wild—there were few I felt closer to, or felt I knew better, than that first telemetered coachwhip. One might be labeled a pathetic misanthrope, if not a flaming idiot, for suggesting anything resembling a friendship with one of nature's least amicable snakes. The fact is, coachwhips don't make friends. To imagine otherwise is certainly unscientific. But I've never professed to be a pure scientist, and the truth is, living things I come to know become personalities to me, if not at the individual level, then at the species level.

I've never quite been sure why, but sometimes it seems the personalities in longleaf sandhills fit together more perfectly than they do in most other places, and that removing any one could diminish the persona of the entire system—be it the spiderwort's little splash of pink that can make me stop just to look; or the big, blue-green *Scolopendra viridis* that can seriously light up your pain receptors if you mistake it for something other than our largest centipede; or the great crested flycatcher's derisive "Creep!" as she nails deerflies and lines her nest with shed coachwhip skin. For me, removal of certain 6-foot, black-and-tan strands would irreparably damage the whole fabric. Days with wild coachwhips are different from ordinary days.

Besides, I never gave the snake a name—only a number (MF1). For nearly 15 months I spied on her, locating her more than 90 times during that period and slowly learning her ways. Withheld secrets notwithstanding, she taught me more about coachwhips than I'd ever learned from books, captive specimens or random encounters. And I might add that she never bit me.

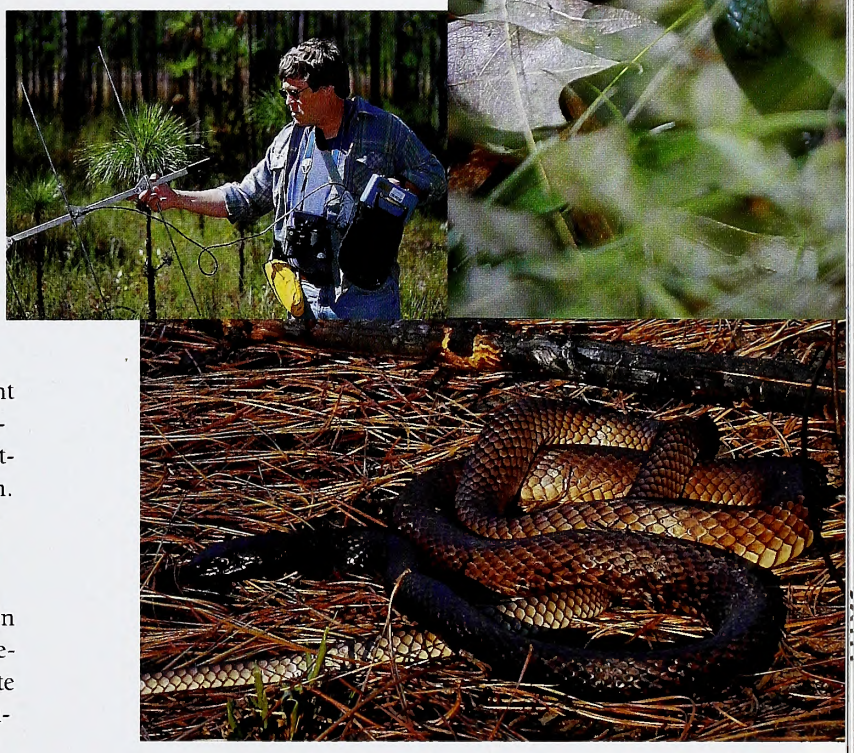
I've since tracked seven other coachwhips, all on the Sandhills Game Land in Scotland County. All had large home ranges and knew their way around them, visiting favorite spots repeatedly. All hibernated in stump holes—sometimes

And I might add that she never bit me.

shared with other coachwhips, corn snakes and pygmy rattlers. Two changed hibernacula during warm periods in January. One adored fallen logs; another hunted wildlife food plots. Still another was a climber who sometimes watched me from above. They frequented canebrakes and other wet areas more than I'd have expected. But I've yet to observe mating, nesting or feeding. Telemetry doesn't reveal everything. For example, most coachwhip dietary information has been gleaned from the stomachs of roadkills. The snakes are opportunists, taking mostly lizards, other snakes, mammals and birds. Six-lined racerunners are especially savored. Much remains to be learned about these ophidian extremists.

Should you read this in air-conditioned comfort, know that I'll be sweating through stands of turkey oak and wiregrass, or maneuvering a receiver antenna through blackberry and smilax, hoping to see Emily Dickinson's "whip lash unbraiding in the sun" before fire-ringed eyes spot me. I'll have minimal encouragement, consisting of maybe one or two of those blue jewels that might well sing in a furnace, indigo buntings. A summer tanager might spit a few phrases, or a nighthawk might sound its unearthly dihedral boom. I might even get "Creep!" from a flycatcher or "Queer!" from a beautiful red-headed woodpecker. Racerunners will dash about.

Mostly, though, it'll be deerflies, gnats, poison oak and sweat for company, and I may find it useful to remind myself repeatedly of how fortunate I am that so many of my days have been coachwhip days. ◆



Coachwhips are somewhat antisocial and are excellent at hiding, so the author spent quite a bit of time tracking his subject using his radio equipment.

Jeff Beane is a herpetologist at the N.C. Museum of Natural Sciences.

NATURE'S WAYS

How can snakes move so quickly without limbs?

See Nature's Ways, page 39.

A New Twist

ON AN OLD THEME

The shotgun's affordability and usefulness in hunting a variety of game have long made it popular. However, by switching barrels and employing a longer chamber, the shotgun's legendary flexibility can become practically limitless.

WRITTEN BY MICHAEL O. HUMPHRIES
PHOTOGRAPHED BY MELISSA MCGAW

Being an outdoorsman can become a surprisingly expensive pastime. Just stroll down the aisles of your local sporting goods store, and you'll find specially designed pieces of gear for every nuance of every hunting discipline out there. Do you want about a million different camouflage patterns from which to choose? You've got them. How about myriad GPS units? Check. Range finders? Likely a row of them there.

And that's just your ancillary equipment. How about one of the most important pieces of gear, your firearm? This is no easy choice, either. Do you want to hunt bears, deer or boars? You can take a look at a powerful, scoped centerfire rifle. Do you want to shoot quail, pheasants and grouse, or just break clays at the local skeet range? There are many nice over-and-under or side-by-side shotguns that would fit the bill. Is your game wild turkeys? Then you can take a look at a stubby-barreled, 3½-inch-chambered 12-gauge shotgun — maybe with an electronic sight. Ducks and geese? Perhaps a nice long-barreled waterfowling shotgun. Squirrels and rabbits? A .22 rimfire rifle should do the job.

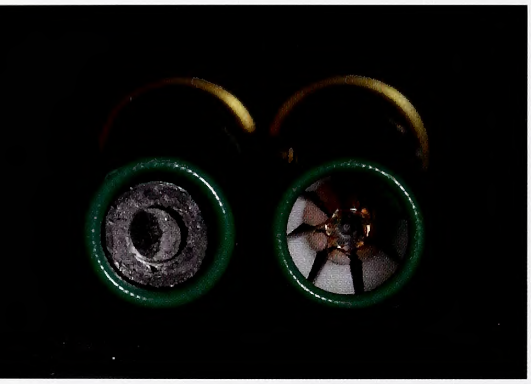


IMAGE COURTESY OF REMINGTON ARMS COMPANY, INC.

The Remington Buckhammer (top, left shell) is a full-diameter slug while the Remington Core-Lokt Ultra sabot (above, right shell) features a plastic sabot around a smaller-diameter projectile. The interchangeable choke tube system of the 26-inch smoothbore barrel (top, right) allows users to use one barrel to hunt a variety of game. The Express Super Mag Combo comes with both a 26-inch smoothbore and a 20-inch rifled-bore barrel.

You have now picked out everything you need to keep yourself busy hunting in North Carolina for a good chunk of the year. You've also amassed a bill that easily reaches into the thousands of dollars.

The truth is most of us don't have a great deal of money to spend on what we like to do. For those living on a budget, cutting things down to the basics is the only solution. Although most of those specialized pieces of equipment and firearms are interesting and highly effective for their intended purposes, you won't shortchange yourself by simplifying things a bit.

THE EASY ANSWER?

Although no one should question whether or not each of those specialized guns achieves its goal admirably, you may reasonably question whether the sportsman can (pardon the pun) kill two birds with one stone. One solution lies in the humble yet versatile shotgun, which has been used by sportsmen for centuries. The current-day shotgun is, by its nature, an extremely flexible firearm. It can fire a variety of loadings in differing shell lengths. The smoothbore nature of the shotgun is what lends it such versatility, allowing for a near-limitless variety of pellets and projectiles that can be fired through it.

Another feature that makes the modern shotgun so exceedingly adaptable is the ubiquitous screw-in choke tube. The choke, or constriction, at the end of the muzzle of a smoothbore shotgun is what determines how the shot will pattern downrange. A tighter choke (such as "full" or "extra full") is ideal for longer-range shots on waterfowl like geese, and a more open choke (such as "improved cylinder" or "modified") is better for close-range shots on fast-flushing targets like quail. In the days before interchangeable screw-in choke tubes, a shooter was stuck with whatever constriction the manufacturer bored into his shotgun's barrel. Now, with the ability to simply screw in a variety of choke tubes in a matter of minutes, the shotgun shooter has nearly unlimited flexibility.

HEAD AND SHOULDERS ABOVE

What shotgun gauge is the most useful across the board? While a 10 gauge does admirable work on waterfowl and has a long tradition of excelling where large payloads of shot are needed, it can be bulky and arguably too rare on store shelves for a broad-based approach to hunting. On the other hand, lighter gauges are not adaptable enough. The extremely popular 20-gauge chambering, although ideal for fast-handling bird guns, does not offer the flexibility of a larger gauge. The other common and not-so-common gauges, such as 16, 28, 32 and .410 bore, are also too specialized, although extremely popular.

Frankly, the 12 gauge is the most established shotshell size available, and there is an enormous number of task-specific loadings developed for it. Encompassing target, field and magnum loadings, the offerings available in 12 gauge range from light target loads for clays to heavy-hitting buckshot and slugs for bigger quarry.

The 12 gauge also possesses one other distinct advantage—its overall length. Though the most common shell lengths are 2¾ inches and 3 inches, 12-gauge makers added the 3½-inch length in the late 1980s to offer greater velocity, range and shot payload potential. The 3½-inch shell was developed to answer the needs of waterfowlers shooting steel shot, offering performance in the range of revered 10-gauge waterfowling shotguns but in smaller, lighter and more affordable guns.

As the years have passed, shotgunners have developed more and more uses for the 3½-inch shell. Turkey hunters, always looking for a way to throw more pellets even faster downrange at their wary prey, took to the greater velocity and payload advantage of this shell length. In addition, other adaptations such as 3½-inch buckshot shells have further expanded the flexibility of the 12-gauge shotgun.

The beauty of the 3½-inch chambering is that all other 12-gauge shell lengths and loadings can also be used. For example, one 3½-inch-chambered 12 gauge can be used to hunt anything from squirrels, by firing light 2¾-inch shells with No. 6 shot, to boar, with 000 buckshot, to geese, with a 3½-inch shell with No. 2 shot (see chart at right).

This mind-boggling flexibility is possible because of one thing—headspacing. Headspace is simply the distance from the face of the closed breech (the area on the front of the breech face that rests against the rear of the cartridge) to the forward surface in the chamber on which the cartridge seats (see diagram, page 18). On shotgun shells, the headspace is centered on the rim at the base of the shell. The critical dimension required for the firearm to hold the shell the chamber is located back at the base, allowing for differing lengths of shells to fit forward into the chamber.

THE SLIDE RULE

Accepting that a 3½-inch-chambered 12-gauge gun is the path to follow, the type of operation of the firearm would be the next logical decision. There are semiautomatics, single-shots, side-by-sides, over-and-unders and even some bolt-actions from which to choose, but these types may not be the best approach for an affordable, all-around gun.

Semiautomatics can be expensive and complex in some cases. Also, finding one that can function with shells ranging from the heaviest 3½-inch down to the lightest 2¾-inch can take some looking. Single-shots, though unfailingly reliable and exceedingly affordable, do not offer the fast follow-up shot that may be needed in some cases. What about over-and-unders and side-by-sides? These can be expensive, and good luck on finding one with a 3½-inch chamber. A bolt-action shotgun? Too mission-specific and uncommon.

With what does that leave us? The humble slide-action (or "pump") shotgun. These are fully functioning repeaters that are almost

RUSSELL A. GRAVES

IN THE FIELD

North Carolina hosts a broad range of quarry for hunting, and the versatile shotgun can handle most all of it with the right barrel, choke and ammunition combination. A smoothbore barrel obviously offers the broadest range of use, and a rifled bore is useful primarily for bigger game.

The listing here is merely a basic recommendation, as each individual user may find a combination that suits the conditions found in the field and works best for him or her. It is best to experiment with your particular gun, choke and ammunition and see how it performs before you take it out. An important caveat is that for game such as boars or bears it is best to stay in the upper ranges of power and performance.

SMOOTHBORE BARREL

Target	Loading / Length in inches	Choke
Bear	00 or 000 buckshot, 3 or 3½	Full
Boar	00 or 000 buckshot, 3 or 3½	Full
Deer	Any size buckshot, 2¾ to 3½	Full
Duck	#2 to #6 shot, 2¾ to 3½	Modified
Geese	T to #2 shot, 2¾ to 3½	Full
Grouse	#5 to #7½ shot, 2¾ to 3	Improved cylinder
Pheasant	#4 to #6 shot, 2¾ to 3	Modified
Quail	#6 to #9 shot, 2¾	Improved cylinder
Rabbit	#6 shot, 2¾	Improved cylinder
Skeet shooting	#9 shot, 2¾	Skeet
Sporting clays	#7½ shot, 2¾	Modified
Squirrel	#6 shot, 2¾	Improved cylinder
Trap shooting	#8 shot, 2¾	Full
Wild turkey	#4 to #6 shot, 2¾ to 3½	Extra full

RIFLED-BORE BARREL

Target	Loading / Length in inches
Bear	Sabot slug, 2¾ to 3
Boar	Sabot slug, 2¾ to 3
Deer	Sabot slug, 2¾ to 3

RUSSELL A. GRAVES

By simply installing a turkey choke tube and getting some proper ammunition, a 3 1/2-inch-chambered shotgun can easily become an ideal turkey gun.

always modestly priced and, with their manually operated actions, flawlessly functional with a broad range of loadings.

Another advantage of this type of shotgun is that barrels can often be easily switched in a matter of seconds. Most modern slide-action shotguns feature a locking system in which the bolt engages directly into a notch in a barrel extension at the rear of the barrel. The strength of this system for the manufacturer is that it lowers the costs of production and simplifies manufacture by removing the locking system from inside the receiver itself. The advantage for the shooter is that, with the bolt locking directly into the barrel, headspace is consistent and safe from barrel to barrel as you switch them.

A SOLID PERFORMER

The ability to switch barrels is important because it can allow you to turn your basic shotgun into a rifle of sorts by employing a fully rifled barrel. With this you can fire slugs, which are solid projectiles, as opposed to a grouping of pellets or shot.

While you can fire slugs through a smoothbore barrel, a rifled bore really takes you to the next level of performance for relatively minimal cost and almost no effort. It is important to note that a fully rifled barrel will usually perform best with sabot slugs, which incorporate a plastic sleeve around a smaller (usually .50- to .58-caliber) projectile. They offer higher velocity and flatter trajectories than a full-diameter projectile.

Now, I am not seriously arguing that the rifled slug barrel turns a shotgun into the equal of a centerfire rifle. However, that's not really the point, is it? This whole exercise is about striking a balance between adaptability and specialization. Although that centerfire rifle will best a rifled-bore shotgun in both range and accuracy, it would make for a poor companion in a duck blind or at a skeet range, unlike that same shotgun fitted once again with a smoothbore barrel.

The beauty of switching out your smoothbore barrel for a rifled one is that, with one simple step, you have turned your shotgun into roughly the equivalent of a rifle chambered in the revered .45-70 cartridge. Dating back to 1873, this cartridge is a proven big-game stopper. The .45-70, on average, hurls a 400-grain bullet at around 1,350 feet per second. For comparison, a 12-gauge, 2 3/4-inch sabot slug lobs a 1-ounce (or 437.5-grain) projectile at around 1,450 feet per second. In terms of power, the 12-gauge slug is easily in the power range of the .45-70, and this is before you have moved into longer shell lengths that offer even more power.

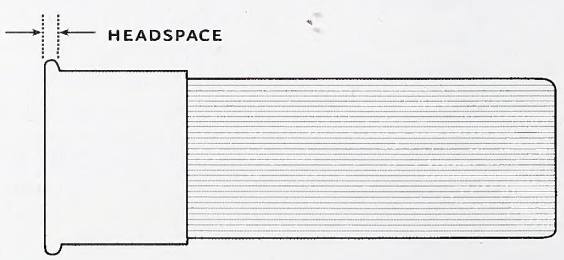
PRETTY IS AS PRETTY DOES

Frankly, all this is academic until one actually finds a shotgun that suits one's needs. I had been mulling this over in my head as I walked the aisles of a local gun show, and then I saw it. What caught my eye was a Remington 870 Express Super Magnum Combo with a laminated stock set. The 7 1/2-pound, 12-gauge, 3 1/2-inch-chambered shotgun, packaged with both a smoothbore barrel and a rifled-bore barrel, had every feature for which I was looking—all for between $500 and $600 retail. The shotgun's magazine tube holds three 3 1/2-inch shells or four of the shorter 2 3/4-inch or 3-inch shells.

The Express series of Model 870 shotguns uses the basic 870 platform, which has been around for almost 50 years with more than 6 million examples manufactured, but strips it down to its basics. Those familiar with the more finely appointed Wingmaster Model 870 will recognize the basic gun but will immediately note the more spartan approach to the design. No engraving. No polishing. No frills. The Express is meant to be all business and nothing more. However, this very quality—which might keep the gun from being proudly displayed on a wall—makes it ideal for the rough environment of the outdoors.

The dull, matte-blue finish on the steel results in a textured surface that is nonreflective and resistant to corrosion. The laminated stock set was appealing because it is far more

WHAT IS HEADSPACE?



Headspace, a critical dimension inside the chamber of a firearm, is a measurement of the distance from the face of the closed breech (the area on the front of the breech face that rests against the rear of the cartridge) to the forward surface in the chamber on which the cartridge rests.

On shotgun shells, the headspace is centered on the rim at the shell's base. This allows shotguns the flexibility to fire shells of differing lengths (provided they are no longer than the chamber length of the barrel).

resistant than hardwood to warpage and moisture damage. Laminate stocks are made by gluing thin layers of wood together, with the glue impregnating the wood and resulting in a stable and moisture-resistant stock.

A couple of the few "extravagances" on the simple Express are the addition of the ventilated rib on the smoothbore barrel and the inclusion of the interchangeable screw-in choke tube system at the muzzle. However, not to have included these features on a modern sporting shotgun would have bordered on the heretical for many.

THE LONG AND SHORT OF IT

The Super Magnum Combo answered the one question still lingering in my mind: What is the best barrel length for the smoothbore barrel? Remington had played it safe, going with a 26-inch barrel, and I think it was an excellent choice. It is long enough to provide good swing and pointing, but not as potentially unwieldy as a 28-, 30- or 32-inch barrel. This barrel length is appropriate for hunting longer-range targets such as geese and gives you proper feel and swing for wingshooting or skeet shooting. At the same time, it is reasonably short and handy enough for turkeys, or for deer or boar hunting with buckshot. It is not the perfect solution for all these disciplines, but it strikes a good balance. The second barrel with the shotgun is a short and handy, fully rifled 20-inch barrel. It has a 3-inch chamber and adjustable rifle sights and is good for use on deer, boars and bears.

MAGNUM OPUS

Ironically, this gun's lack of specialization for each of the many types of hunting here in North Carolina is precisely what makes it so special. Though it may not be the very best at each discipline, the fact that it can handle almost all of them by taking advantage of the current-day strengths of shotgun design ensures that this combo gun's utility far outweighs its cost, making it truly a new twist on an old theme.

If you are on a tight budget but still want to get out into the hunting fields this year, I heartily recommend that you walk past all those fancy, expensive offerings at your local gun shop and check out the humble shotgun. You won't be disappointed. ◆

Michael O. Humphries is managing editor of Wildlife in North Carolina *magazine.*

ON THE OTHER HAND

While my personal choice was a Remington Super Magnum Combo, it is not the only game in town. For example, Mossberg offers its Model 535 ATS Field/Deer Combo for a bit under $400 retail, and Benelli sells its Nova Pump Field and Slug Combo for under $600. These, just like the Remington, are well-made guns that will get the job done.

MOSSBERG MODEL 535 ATS FIELD/DEER COMBO

IMAGE COURTESY OF O.F. MOSSBERG & SONS, INC.

NOVA PUMP FIELD AND SLUG COMBO

IMAGE COURTESY OF BENELLI USA

RUSSELL A. GRAVES

The extreme flexibility of the shotgun allows for one single gun to pull multiple duties. By simply switching out a choke tube, the same gun could hunt turkeys one day (above) and then do a full day of wingshooting another.

RUSSELL A. GRAVES

North Carolina Hunting Seasons 2007-2008

SPECIES		HUNTING SEASON	DAILY LIMIT	POSSESSION	SEASON
BLACK BEAR		See *Regulations Digest, P. 38*	1	1	1
DEER[1]			2	6[2]	6[2]
	Bow and Arrow	Sept. 8–Oct. 5 (Eastern) Sept. 10–Oct. 6 and Oct. 15–Nov. 17 (Western) Sept. 8–Nov. 2 (Central) Sept. 8–Nov. 9 (Northwestern)			
	Muzzleloading	Oct. 6–Oct. 12 (Eastern) Oct. 8–Oct. 13 (Western) Nov. 3–Nov. 9 (Central) Nov. 10–Nov. 16 (Northwestern)			
	Gun	Oct. 13–Jan. 1 (Eastern) Nov. 19–Dec. 8 (Western) Nov. 10–Jan. 1 (Central) Nov. 17–Dec. 15 (Northwestern)			
	Gun, Either Sex and Special, Either Sex	See *Regulations Digest*			
WILD BOAR		Oct. 15–Nov. 17 and Dec. 10–Jan. 1[3]	1	1	2
WILD TURKEY	Either Sex Male Or Bearded Only Youth Hunt (Male Or Bearded Only)	Jan. 14–Jan. 19[4] April 12–May 10 April 5 *(statewide on private land)*	1 1 1	1 *(Annual bag limit is* 2 *2 wild turkeys, only 1 of which may be taken in winter season.)*	2
EARLY CANADA GOOSE SEASON		Sept. 1–Sept. 29	8[5] *(except for part of Dare County where limit is 2)*	16[5] *(except for part of Dare County where limit is 4)*	None
DOVE		Sept. 1–Oct. 6 (noon until sunset from Sept 1–Sept. 8; thereafter, shooting hours are ½ hour before sunrise until sunset) Nov. 19–Nov. 24 Dec. 17–Jan. 12	12	24	None

SPECIES		HUNTING SEASON	DAILY LIMIT	POSSESSION	SEASON
RAILS, MOORHEN & GALLINULE	Moorhen & Gallinule	Sept. 1–Nov. 9	15	30	None
	Clapper Rail, King Rail	Sept. 1–Nov. 9	15	30	None
	Sora Rail, Virginia Rail	Sept. 1–Nov. 9	25	25	None
EARLY TEAL SEASON		Sept. 13–Sept. 22 (east of U.S. 17 only)[6]	4	8	None
COMMON SNIPE		Nov. 14–Feb. 28	8	16	None
WOODCOCK		Dec. 14–Jan. 12	3	6	None
RED & GRAY SQUIRREL		Oct. 15–Jan. 31	8	16	75
FOX SQUIRREL		Oct. 15–Dec. 31 (only in 23 counties; season closed elsewhere; see *Regulations Digest, P. 39*)	1	2	10
RABBIT Including Box Trapping		Nov. 17–Feb. 29	5	10	75
QUAIL		Nov. 17–Feb. 29	6	12	None
RUFFED GROUSE		Oct. 15–Feb. 29	3	6	30
PHEASANT Non-native Male Pheasant Only		Nov. 17–Feb. 1	3	6	30
RACCOON & OPOSSUM		Oct. 15 (sunrise)–Feb. 29	No restriction on opossum (see *Regulations Digest P. 39* for raccoon)		
BOBCAT[7]		Oct. 15–Feb. 29	No restriction		
FOX		Nov. 17–Jan. 1 and Jan. 5–Jan. 26	Limited to certain counties, see *Regulations Digest*		
MIGRATORY WATERFOWL		Federal regulations may be obtained at www.ncwildlife.org or by calling toll free 1-800-675-0263 after Labor Day			
COYOTE		No closed season or bag limits. Electronic calls allowed			
GROUNDHOG		No closed season or bag limits			
NUTRIA		No closed season or bag limits (except Currituck County, see *Regulations Digest*)			
BEAVER		See *Regulations Digest*			
CROW		Wed., Fri., Sat. of each week from June 1 through the last day of February plus Labor Day, Thanksgiving Day and Christmas Day (Seasons shown are valid through June 30, 2008) No bag limits			
STRIPED SKUNK		No closed season or bag limits			

See *2007–2008 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons. For a copy of the *Regulations Digest*, write: N.C. Wildlife Resources Commission, 1722 Mail Service Center, Raleigh, NC 27699-1722 or visit www.newildlife.org.

See *Regulations Digest* P. 43 for buck bag limits.

In Cherokee, Clay, Graham, Jackson, Macon and Swain counties. In the other 94 counties, feral hogs are not considered to be wild boars, and the commission does not regulate them.

See *Regulations Digest* for counties open to winter turkey hunting and Game Land permit opportunities.

In the area of Dare County that includes Roanoke Island, 1,000 yards around Roanoke Island and 1,000 yards both north and south of the Highway 64 causeway between Roanoke Island and Bodie Island, the daily bag limit for Canada geese is 2 with a possession limit of 4. West of U.S. 17, shooting hours extended to ½ hour after sunset.

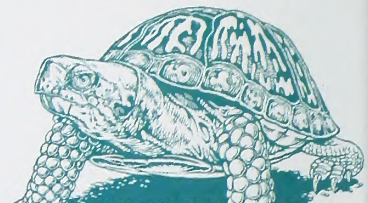
Includes blue-winged, green-winged and cinnamon teal.

The bobcat season is closed in the Harmon Den and Sherwood bear sanctuaries in Haywood County.

Variety in the Plain

Wildlife Action Plan

KEEP COMMON ANIMALS COMMON



In North Carolina's Coastal Plain, water is the hub around which conservation of land and animals revolves.

This is the fourth of a five-part series about North Carolina's Wildlife Action Plan. Each successive story will discuss how the plan is being implemented in a different region, culminating with a final piece about statewide initiatives.

MARCH	INTRODUCTION TO THE PLAN
MAY	MOUNTAIN REGION
JULY	PIEDMONT REGION
SEPTEMBER	**COASTAL PLAIN REGION**
NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

If you are traveling across the Fall Line, where would you fall? Well, you might tumble down a cascade or two, but you would enter into a region of North Carolina that makes up about 45 percent of the state—the Coastal Plain. The Fall Line, which is actually a zone a couple of miles wide, separates the Piedmont from the Coastal Plain.

Up above the Fall Line, the rivers bubble out of the rocks and springs in the Piedmont and tumble down ancient bedrock and cobble. As water flowing east approaches the Fall Line, somewhere around Interstate 95, rivers exchange their rocky falls and cascades for sandier bottoms and logjam riffles. Large, ancient-looking cypress trees and their knees border the rivers and the wide floodplains, as the surrounding terrain flattens.

The Coastal Plain landscape is home to some of the state's rare creatures and unique habitats. Endangered creatures found only in eastern North Carolina, such as the Carolina madtom and the federally endangered Tar River spinymussel, call the region home. The rivers wind eastward past Tarboro, Greenville and Kinston, Cliffs of the Neuse and Great Dismal Swamp. They meander by Washington, New Bern and Jacksonville, Bladen Lakes and Croatan National Forest.

On the last leg of these rivers' journeys before entering the sounds, the full effect of tannins from the trees are seen in the tributaries and swamps. Water becomes so black that the surface looks like a mirror. The rivers run to the coastline and mingle together in the estuaries and sounds. It is here that submersed vegetation is found, providing refuges and nursery areas for a host of shorebirds and waterfowl, sea turtles, saltwater fish and shellfish.

The Coastal Plain hosts 16 different types of unique habitat such as floodplain forests, longleaf pine stands, grasslands, forested wetlands, coastal dunes and savannas. Dotting the landscape are mysterious Carolina bays and pocosins, which boast unique aquatic fauna such as the Carolina pygmy sunfish, Phelps killifish, Waccamaw silverside and

written by **ROB NICHOLS**

Waccamaw fatmucket mussel. Many terrestrial creatures use these habitats as well: the prairie warbler, red-headed woodpecker, hooded warbler, star-nosed mole, long-tailed weasel, Southern bog lemming, oak toad and many-lined salamander. Ancient sand dunes in the Sandhills boast an amazing diversity of wildlife, including the fox squirrel, Carolina crawfish frog, Northern pine snake, bald eagle and Rafinesque's big-eared bat.

Unfortunately, these places are also some of the most endangered ecosystems in the country. Many of the threats to these systems are related to human population growth — land development, fragmentation, sedimentation, increased wastewater discharges and water withdraws. Many unique Coastal Plain species do not react well to habitat changes and loss. Fortunately, the state is planning ahead by using partnerships and land conservation to preserve many of these habitats, creatures and ecosystem functions.

The Wildlife Action Plan addresses these threats to our unique Coastal Plain habitats and wildlife. But planning and action are not just for the sake of animals; people will benefit too. As we work to protect wildlife and the places it lives, we will be working to protect our drinking water, our recreation areas, our farmland and our quality of life.

CATFISH IN A COAL MINE

The Tar and Neuse rivers exist entirely within North Carolina. They are born in the Piedmont and flow through the Coastal Plain into the Pamlico Sound. The rivers host many of the same fish, freshwater mussels and other aquatic organisms. On both waterways, the fall zone is an area where many rare fishes and

CHANGING CLIMATE, CHANGING COAST

As a result of global warming, temperatures are expected to increase over the next century by 3 to 9 degrees Fahrenheit, and sea level is expected to rise by 7 to 24 inches. These environmental changes would have significant impacts on the beaches and coastal communities of North Carolina. Storm surges may alter the location of inlets, and the sounds are likely to be saltier. If climate change continues unabated, many of our barrier islands and much of the far eastern Coastal Plain would be underwater.

But what about the other residents of our coastal communities — the wild creatures that live on the beaches and in the sounds? While people will have the option to move away from the coast as water levels threaten their homes, wildlife will be more limited because it is often closely tied to the ecosystems it inhabits.

The most serious threat to wildlife is loss of habitat. Rising sea levels would drown beaches and marshes critical for nesting and feeding. While new beaches and sounds would form eventually, it is impossible to know if they will provide suitable habitat to support the animals that currently use our ocean habitats. Increased storm intensity may further threaten nesting success for animals like sea turtles and coastal birds.

Interestingly, even the gender of sea turtles may be impacted as temperatures rise. Clutches that incubate in higher sand temperatures produce more female than male turtles. Under current conditions, Florida nests produce mostly females while North Carolina nests at the cooler, northern extent of nesting grounds hatch nearly half males. As temperature rises, N.C. nests would tend to produce more females. It will be important that suitable nesting areas be available at higher latitudes, where turtles do not currently nest. Protecting potential nesting sites now is one way humans can plan ahead for coastal wildlife.

American oystercatchers, piping plovers, black skimmers and least terns are some of the beach-nesting birds that would be impacted as sea level rises. Hotter weather is stressful for nestlings. These waterbirds rely on marsh and estuary ecosystems for food. Increased storm activity, sedimentation in estuaries and changes in salinity are likely to affect the prey species that waterbirds feed on.

The distribution patterns of coastal songbirds also may be altered as the climate changes. The summer ranges of some species may shrink or increase in North Carolina as the rise in temperatures affects the plant and insect communities these birds rely on for food and shelter. Waterfowl would have to adjust their migratory behavior in response to temperature and water conditions. Another big concern in North Carolina is the availability of suitable marsh habitat and winter food resources for ducks, geese and swans as the aquatic habitats throughout the Coastal Plain change.

It is very difficult to foresee the full extent that climate changes would have on North Carolina's wildlife diversity. But there are ways to help wildlife maximize its chances of surviving the impact of climate change. By conserving existing coastal habitats and creating buffer areas with no development, especially near shorelines, protected habitat will be available inland. And most importantly, any steps that we can take now to slow global warming can lessen the impact of climate change for humans and wildlife.

– Carol Price

JACK DERMID

BLACK-NECKED STILT
(Himantopus mexicanus)

mussels are found and where rapid development is occurring. Centers of diversity such as Swift Creek and Fishing Creek in the Tar basin are becoming endangered.

The history of human activity in the two river systems looks quite different. The Neuse River has its origins near the rapidly growing Raleigh-Durham area. This population expansion in the Neuse basin has driven an increased need for drinking water, pollution controls and rapid land development. Sediment and excess nutrients in the Neuse — consequences of rapid growth — have resulted in degraded water quality. The Neuse is now on the top-10 list of the most endangered rivers in the country. Disappearing populations of rare fishes such as the Carolina madtom have reflected the changes in water quality and habitat.

Current projections show an upward population growth in the upper sections of the Neuse and Tar rivers. Because the Tar River basin has been sheltered from many of the impacts that are happening in the Neuse, the Tar has been able to retain some rural characteristics. However, pressure to develop land in the Tar basin is predicted to follow the same path as the Upper Neuse. To see the effects of changes in the Tar and Neuse basins, biologists can monitor populations of sensitive animals.

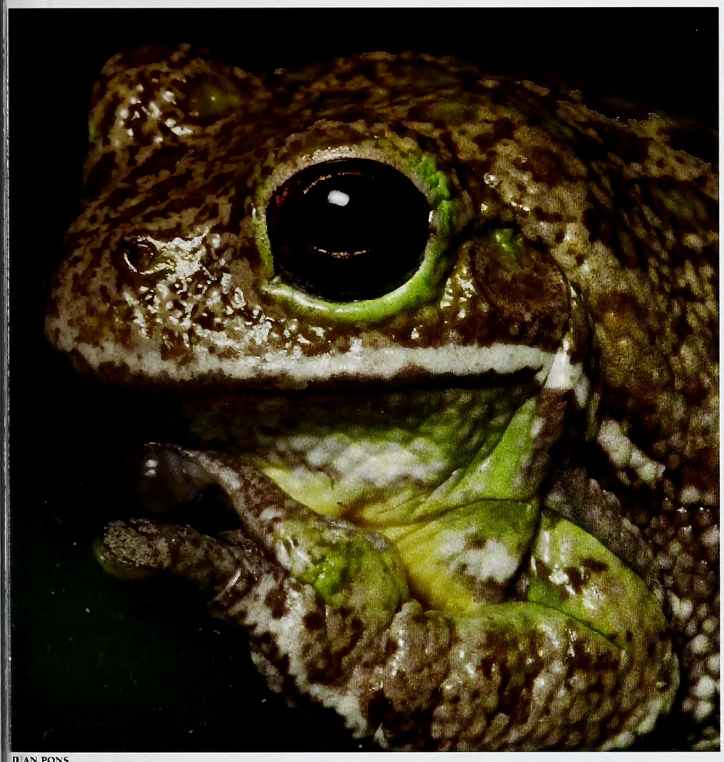
Like a canary in a coal mine, the Carolina madtom can serve as a warning that things are not well. Biologists are surveying 60 sites in the Tar and Neuse basins and comparing the results to where the fish occurred in the past. The madtom is nocturnal, well camouflaged, and hides in nooks and crannies during the day. To find the fish, biologists put on wetsuits and snorkels and shine dive lights into cavities underneath packs of leaves, sticks, logs and large rocks.

For the madtom to survive and successfully raise young, its hiding places cannot be buried in silt and sediment. Excess nutrients that cause algal growth, and chemicals from wastewater can inhibit reproduction. The madtom has disappeared from many areas in the Neuse River but is faring better in the upper section of the Tar River and its tributaries.

Coastal conservation initiatives are designed to protect animals and habitat such as the piping plover (chicks and eggs in a nest), the marsh rabbit, the barking treefrog and natural Carolina bays such as Singletary Lake.

JAMIE CAMERON

JACK DERMID



JUAN PONS

NCWRC

As we work to *protect wildlife and the places it lives,* we will be working to *protect our drinking water, our recreation areas, our farmland* and our *quality of life.*

UNPRECEDENTED LAND ACQUISITION HELPS PUT WILDLIFE INTO ACTION

During 2007 and 2008, the N.C. Wildlife Resources Commission will acquire 66,000 acres of land formerly owned by International Paper. The purchase represents the largest land conservation action in the Wildlife Commission's history. This massive, landscape-scale acquisition provides an opportunity to put an important part of the N.C. Wildlife Action Plan into practice. The tracts are associated with four major river basins: Chowan, Roanoke, Tar and Juniper Creek in the Lumber basin. Purchasing such large acreages on major waterways also helps protect water quality.

The scale of this acquisition has tremendous benefits for managing wildlife in our state. Acquisition of large pieces of property allows the commission to acquire contiguous, unfragmented habitat that is useful for species that require large interior tracts. These sizable tracts also enable fish and wildlife populations to attain healthier population sizes.

Chowan River

The Chowan River tracts total 15,000 acres of high quality wetlands that serve as a critical nursery for anadromous fish such as river herring, American shad and hickory shad. The eastern portion of the Chowan tracts, known as the "sandbanks," represents the northernmost range of longleaf pine and may prove to be a critical area for recolonizing red-cockaded woodpeckers.

Roanoke River

The bottomlands that border the Roanoke River are part of the most ecologically diverse bottomland hardwood river system in North Carolina, hosting large populations of wild turkeys and deer. These tracts are just upstream of another 50,000 acres of conservation land owned by both the state and federal governments. Protecting this extensive, high-quality habitat corridor also allows for the protection of many species if rising sea levels alter the composition of lower Roanoke game lands.

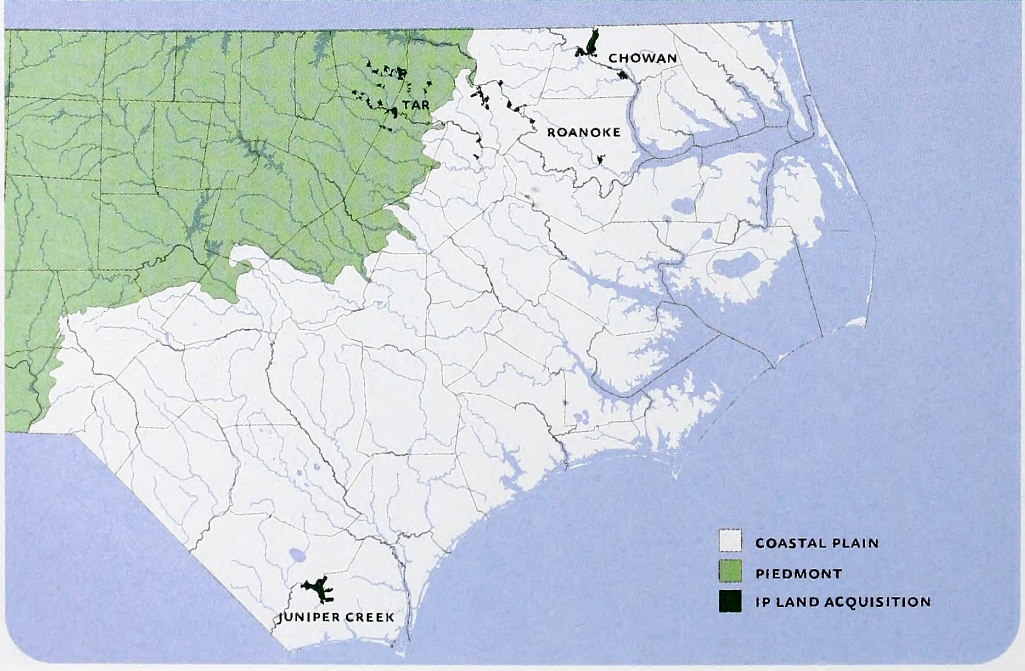
Tar River

The tracts that will be acquired on the upper Tar River in Warren, Franklin, Nash and Halifax counties help protect water quality in the healthiest streams in North Carolina's Piedmont. Many of the streams running through these properties still provide habitat for a wide range of freshwater mussels, species that are vulnerable to sedimentation coming in from land disturbance and development. These species have long disappeared from many other streams in our state.

Juniper Creek

Juniper Creek represents a large, 18,500-acre bottomland hardwood forest amid the timber plantations and the phenomenal residential development of the state's fastest growing county, Brunswick. As such, it represents a large refuge for interior-dwelling birds such as the Acadian flycatcher and the prothonotary warbler, and is a critical watershed that drains into the Waccamaw River and its nationally significant swamplands.

—George Norris



ROB NICHOLS/NCWRC

The Carolina madtom's population density in coastal rivers indicates water quality.

The Wildlife Action Plan recognizes the sensitive habitat that the Carolina madtom and other creatures inhabit in Swift and Fishing creeks in the Tar basin as unique on the East Coast. Since it is easier to protect wildlife than to restore habitat and populations, the proactive measures in the Wildlife Action Plan provide an opportunity to protect the Tar basin from further impacts. Preserving the quality of the Tar River is one of the goals of the plan.

To do this, conservation partners such as the Tar River Land Conservancy (see "Coordinating Conservation on the Tar," June 2007) and The Nature Conservancy work to broker deals for conservation easements and buffers. Protecting land in priority areas helps reduce sedimentation, buffer the river from adverse impacts and generally maintain the integrity of river basins. It is up to all of us—conservation groups and agencies, local government, industry, agriculture, and citizens—to plan now so the unique resources of the Coastal Plain are healthy for future generations.◆

Rob Nichols is Eastern aquatic diversity coordinator for the N.C. Wildlife Resources Commission. Jeff Hall is the coordinator of Partners in Amphibian and Reptile Conservation for the commission. George Norris is NCWRC grants and contracts biologist. Carol Price is the commission's Wildlife Action Plan coordinator.

TROUBLE IN THE WETLANDS

Wetlands abound in the Coastal Plain. There are rivers, streams, swamps, pocosins, pine flatwoods, savannas, lakes, ponds and Carolina bays. As a result of these abundant, varied wetlands, amphibian diversity in the Coastal Plain is extremely high. Frogs are particularly diverse — 27 of the 30 species found in the state live in the Coastal Plain. At least 22 species of salamanders call these wetlands home. Researchers are learning more and more about these animals. In some cases, a salamander that has been regarded as a single species for many years is actually a suite of species that look similar, but do not reproduce with one another or share the same geographic distribution.

Unfortunately, Coastal Plain amphibian diversity is in trouble. Two frog species, the Carolina gopher frog and the river frog, are currently listed as threatened and of special concern, respectively (see "The Secret Frog," April 2007, and "The Frog Nobody Missed," Dec. 2005). Of our salamander species, the Eastern tiger salamander is listed as threatened and three others as species of special concern (dwarf salamander, four-toed salamander and Neuse River waterdog). However, there are many other species that also may be suffering declines.

An additional seven frogs (oak toad, Eastern spadefoot, barking treefrog, pine barrens treefrog, Brimley's chorus frog, striped Southern chorus frog and ornate chorus frog) and 10 salamanders (Eastern lesser siren, greater siren, Mabee's salamander, spotted salamander, marbled salamander, Southern dusky salamander, three-lined salamander, four-toed salamander, many-lined salamander and an undescribed species known as the Sandhills Eurycea) are priority species in the N.C. Wildlife Action Plan. Biologists are concerned about these species and will be researching them in the coming years.

Biologists have been looking closely at the Mabee's salamander. Although a terrestrial salamander as an adult, Mabee's salamanders, like other members of the mole salamander family Ambystomatidae, require ephemeral pools for egg deposition and larval development. Researchers from East Carolina University and the Wildlife Commission have searched ponds in Pitt County, the Croatan National Forest and Holly Shelter Game Land for signs of the continued existence of this species. Ponds containing larvae have been found in Pitt County and across the Croatan, but no larvae were found this year in Holly Shelter. So far, much of the research points toward a connection between Mabee's salamanders and Carolina bays, which appear to offer some of the best breeding habitat for this species.

Although the Coastal Plain is rich in aquatic habitats, not all of these hold the same value for amphibians. Nearly all of the protected and priority amphibian species listed above spend part or all of their lives in small, temporary wetlands. These ephemeral pools can be quite small and still be invaluable to amphibians. They can range in size from several acres to no bigger than a bathtub. Vernal pools usually fill in the spring, while autumnal ponds typically fill during the fall.

One of the reasons these wetlands are so rich in amphibian fauna is their hydrology. Some of these ponds dry up once a year, some of them dry up every few years, and still others may hold water for many years and only dry up occasionally. The fact that these ponds do dry up makes them wonderful sites for amphibians. When they dry, invertebrate predators such as giant water bugs, crayfish and dragonfly larvae are reduced or eliminated in many of these wetlands. Only the hardiest of fish species such as mud minnows and mosquito fish are able to endure in a few of these wetlands Many ephemeral ponds are completely free of fish.

Ephemeral wetlands are being lost due to development and many of the most valuable of these temporary pools are found in wet pine savannas. These same savannas also host a wide variety of reptiles, mammals, birds, invertebrates and plants. Outright draining or filling in of these wetlands, along with fragmentation of our landscapes, have caused declines in amphibian species across the Coastal Plain. Increased runoff can overload these small ponds, eventually causing them to become permanently dry.

There are plenty of ways we can help amphibians: reduce the amount of chemicals added to yards, retain large upland buffer zones around wetlands, do not add fish to waters that are currently fish-free, and create small depressions on your land that will only hold water during part of the year. Amphibians will travel considerable distances to get to breeding ponds. Chances are good that if you create one of these ponds on your land, you will have breeding amphibians .

–Jeff Hall

JEFF HALL/NCWRC

MANY-LINED SALAMANDER
(Stereochilus marginatus)

A Unanimous VERDICT

Written by Don Mallicoat & Photographed by Melissa McGaw

The result of more than 50 years of constant attention and effort, the J. Robert Gordon Sandhills Field Trial Grounds is considered to be one of the finest facilities of its type.

If you move in bird dog circles, all you have to say is "Hoffman," and folks know of what you speak. It evokes discussion of hard-muscled pointers and graceful setters running field edges among longleaf pines and through broomstraw, scrub oaks and lespedeza patches. Thoughts of the call of "Point" as a gallery of riders gallop on horseback to see the action also comes to mind. And, if you have been around long enough, names such as The Haberdasher, Pinekone Max, D. K. Sing, Jay Waggoner and William McCall will also enter the conversation.

Words like "premier" and "jewel" are accurate descriptions of the field trial grounds at Hoffman, officially known as the J. Robert Gordon Sandhills Field Trial Grounds. Field trial participants will tell you that the grounds are second to none. Owned by the state of North Carolina and maintained by the N.C. Wildlife Resources Commission, it is the top public field trial venue in the nation. Because of this, several years ago it was chosen as the home of the National Open Shooting Dog Championship, which is held in February each year. This status did not just happen. It has occurred over 50 years and requires constant effort by the Sandhills wildlife management crew at Hoffman.

THE ROOTS

Based on a request from the N.C. Field Trial Association in 1953, the Wildlife Commission designated nearly 9,000 acres of the 50,000-acre Sandhills Game Land acquired in 1948 as field-trial grounds and began work on the diamond in the rough. The first trial was held in 1954, and a report in *American Field* in 1956 by Sam Magee portended the future:

The National Open Shooting Dog Championships at the Sandhills Field Trial Grounds is a whirlwind of activities, combining horsemanship, expert dog handling and lots of fun.

The preparations required to maintain the Sandhills are thorough and varied. Prescribed burning of predesignated area is followed by seeding with warm-season grasses (top and above middle). The facility's horse barn and corrals (above) also require yearly maintenance.

"Hoffman, N.C., two years ago was almost unknown to the field-trial world, but from now on it is a name as likely to be heard as Grand Junction, Hernando, or other famed locales of major trials."

The work, started in 1954 and spearheaded by D.K. Sing, has resulted in one of the top field-trial venues in the country. The site now consists of six one-hour courses 36 miles in length, a clubhouse, a 56-stall horse barn, horse corrals and kennel space for nearly 100 dogs. Something that big requires a massive effort by the Wildlife Commission staff. The annual cycle begins in late March after the field-trial season ends.

According to Harlan Hall, supervising wildlife biologist for the Piedmont region, the first thing the Sandhills crew does is perform prescribed burns on predesignated areas. "Within days of the last trial, weather permitting, we start burning the warm-season grass fields," Hall says. "We also burn some of the understory in the woods between the fields." This occurs in early April, near the end of the normal burn period. To complete the burning in such a short period of time requires all hands available at the Sandhills Wildlife Depot as well as staff from throughout the Piedmont region.

In May, the staff starts the planting program in strategic areas on the courses. Most of the seeding is done with warm-season grasses, primarily Atlantic Coastal panic grass, which seems to work best in the Sandhills area. Over the years, the success of warm-season grass plantings has allowed the commission staff to focus more on the maintenance of those areas rather than planting. In addition, several dozen food patches of sorghum are planted. Other plantings have a dual purpose. "We also plant some plots of mixed millet, buckwheat and sunflower primarily for dove fields, "Hall says. "Three or four of those, usually larger fields." Quail also benefit from these dove fields.

The next big project each spring is mowing. "We've got two big mowing periods," Hall says. "The first is in the spring when we go around mowing the woody vegetation that has grown up in the courses where there is not enough fuel to use fire." While this is going on, necessary maintenance of the clubhouse, horse barn, corrals and kennels must be completed. Grading of the roads and trails that crisscross the grounds is also required. Over the past several years the Hoffman staff has been rebuilding the corrals using old railroad crossties and railing. Horses lean and rub against posts and rails, and using these materials instead of wood requires less maintenance.

As the field-trial season approaches in the fall, another mowing is done—this one with a different purpose, driven by what Hall aptly calls a dilemma. "The dilemma is providing enough thick cover to hold quail in the fields while providing enough open cover for a handler to show the dog and let the judges evaluate," Hall said. The courses have to be maintained, and the mowing must ensure that each of the six courses allows dogs to be equitably judged against dogs competing on different courses. The staff at Hoffman and the grounds committee of the field trial association work together to achieve this.

A TRIAL RUN

In early September, Hall and the Hoffman staff go over the courses with members of the grounds committee. They identify areas

n the open fields that need to be mowed for handlers to show dogs. Once these lanes are dentified, three or four Wildlife Commission crew members spend several days on Bush Hogs mowing lanes in the 36 miles of course o provide a final grooming of the fields. At his point much of the work of the Sandhills crew is done. There is one final touch in preparation for the rapidly approaching field rial season—making sure there are plenty of quail for the dogs to find.

The commission does not release quail on any of its game lands. However, in a cooperative agreement, the field trial association buys and releases health-certified, flight-conditioned quail along the courses. According to Dwight Smith, president of the N.C. Field Trial Association, the association releases 25 coveys of 20 quail apiece on each of the six courses in late September. After releasing the birds, the association members' ob begins.

Each week after the birds are released until he end of the field trial season in March, the N.C. Field Trial Association feeds the quail. This serves two purposes: It allows the birds o adapt to the new environment, and it helps o establish the coveys' home range on the course. The club maintains a tractor and nechanical spreader at the barn on the grounds. During the week between trials, the club broadcast spreads a mixture of corn and nilo seed throughout the area to hold the birds on the course. Over the length of the eason, this amounts to about 40 tons of seed.

At the 2007 running of the National Open Shooting Dog Championship, judges and participants alike had high praise for the Sandhills Field Trial Grounds. Jerry Champion from Birmingham, Ala., said, "You're lucky to have hese in North Carolina. We don't have any tate-owned grounds. We're down to about wo to three private grounds in our state." George Tracy, a professional trainer from Pennsylvania with numerous championships nder his belt, also appreciates Sandhills.

"I really love these grounds," he says. "They are some of the best we've run on." One of the judges at the event, Jerrell Bryan from Mississippi, here for the first time, mirrored that same sentiment: "These grounds are great for a field trial. There's plenty of cover on the courses to hold birds, but open enough for us to see the dogs."

Trial scheduling is done by the association, and during the 2006–2007 season, 18 trials were run at the grounds. Considering that there are about 24 weekends over the length of the season, the club and the grounds are popular. This popularity has a definite economic impact on Hoffman and Richmond County. Although an official study has not been done, rough estimates range upward from $350,000 annually just for basics such as hotels and meals. The economic impact could total more than $1 million when it includes other factors such as the purchase of horse feed and hay, the seeding program carried out by the field trial association, gas for vehicles, and guests who visit simply to watch the dogs run.

Although the focus of the area is on field trials and quail, it is still a working part of Sandhills Game Land. For obvious reasons, quail hunting is not permitted, but other types of hunting are allowed. As mentioned earlier, there are several dove fields in the area, and deer and raccoon hunting takes place during the season. There is also an active timber management plan within the field trial grounds. Horseback trail riding is also popular outside the field-trial season.

The people of North Carolina, and particularly hunters and anglers who purchase licenses to support Wildlife Commission efforts, should be justly proud of this crown jewel of the national field trial circuit. "We want folks to know," says Johnny Adkinson, another of the Open Shooting Dog Championship judges, "and particularly the North Carolina Wildlife Resources Commission, how much we appreciate having these grounds and the work that Harlan Hall and his staff do to maintain them."

Don Mallicoat is a freelance writer who lives in Asheville and is an occasional contributor to WINC.

FIELDING QUESTIONS

Bird dog field trials in America have a long and storied history dating back to 1874 when the first trial was run near Memphis. The purpose of field trials is the promotion and development of high-class bird dogs through competition. There are many field-trial sponsoring organizations as well as classifications of trials, such as the National Open Shooting Dog stake described in the story. Dogs that meet breed conformation standards and establish winning records in different field trials provide the foundation of breeding programs that impact the everyday bird hunter who owns dogs.

Horses are often an important part of a field trial. Dogs in most of these stakes are expected to run well to the front of the handler, who is on horseback to observe the dog and to ride quickly to the point. Judges are also on horseback for the same reasons. Because of this, the gallery of observers usually follows the running on horseback to see the action. Some field trials also offer a "gallery wagon" that people can ride to observe the running if they do not have a horse.

If you are interested in learning more about field trials and would like to see the current schedule, visit the American Field Web site at www.americanfield.com.

They work the soil. They prey upon pests. They disperse seeds. These insects go about their various businesses and have been doing so for more than 100 million years.

Ants All Around

written by Rob Dunn / illustrated by Consie Powell
nature activity by Anne M. Runyon

Ants are nearly everywhere on the terrestrial parts of earth, with the exception (for now) of Antarctica. From an ant's perspective, hot is better than cold, wet better than dry. In the tropics, as much as a third of animal biomass may be ants. But even in cold places, ants are common.

ANT FARMERS

In North Carolina soils alone, there are no fewer than 100 ant species, of more than 12,000 species globally. Among these species are cattle farmers (ants that farm aphids for their sugary "milk," much as humans farm cows), farmers of crops (leaf-cutter ants that grow fungus on dead matter and then feed that fungus to their larvae), army ant warriors, predators and even a few parasites that depend on other ant species to care for and feed their young. Many things that might seem uniquely human (farming, cattle grazing, thievery and cooperation) were already present in ant communities 100 million years ago and can be observed in your backyard.

Leaf cutter ants cut bits of vegetation on which they grow fungus to feed their larvae.

More ant species can be found in a tree in Costa Rica, than are known from the entire state of Massachusetts. There are probably more ants in even cool Massachusetts than there are people on earth.

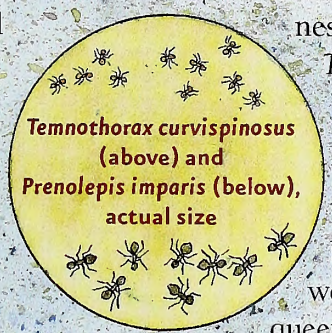
Ants are most closely related to bees, wasps and sawflies. Termites share a lifestyle with ants (a big fat queen, servile workers, sociality) but are unrelated to them.

Ants carefully tend their "herds" of aphids.

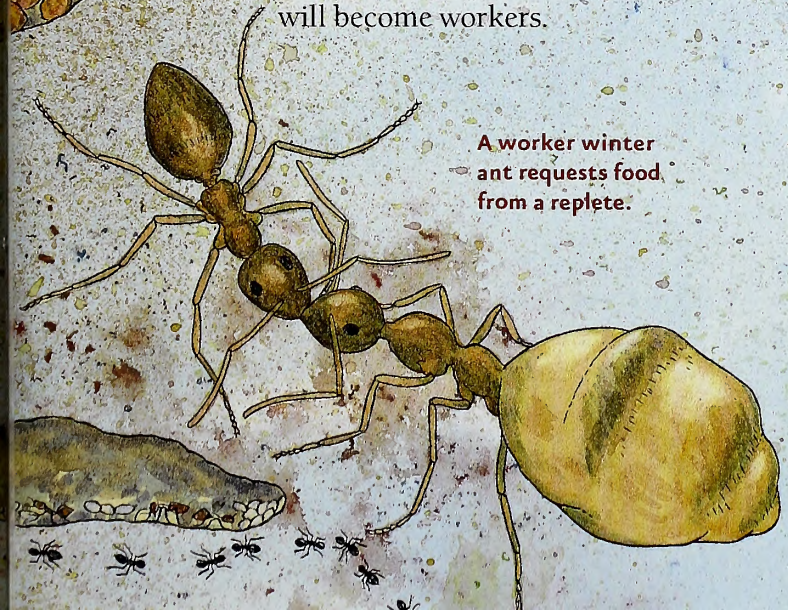
ANTSY FOR COOL WEATHER

One of the most distinctive (yet common) ant species in North Carolina is the winter ant (*Prenolepis imparis*). With a barbell-shaped coffee-colored body, two relatively long antennae, and no sting (as is the case for most North Carolina ants), a winter ant looks like a cartoon ant. Remarkably, winter ants are active throughout their range (Florida to Massachusetts) only during the relatively cooler temperatures of late fall, winter and early spring. Winter ants even occasionally forage on snow. But by the time days get long and hot, winter ants are deep below ground and all traces of any entrance to the nest are obscured.

The nest of winter ants can extend as deep as ten feet underground. A typical nest consists of a single, vertical tunnel and branching off of that tunnel many wide chambers with carefully carved roofs and floors. Arranged among the chambers are multiple queens, eggs, larvae, pupae, workers and repletes. Repletes are young workers who are fed sugars by the older workers until their gasters (the hind part of an ant) swell some 10 to 20 times normal size. During the summer months when the ants are not foraging, the repletes will serve as the colony's food stores. When the workers, queen or larvae are in need of food, they tap the mouths of the repletes, who offer in return a little sugar. In their second year of life, the repletes will become workers.



Temnothorax curvispinosus (above) and *Prenolepis imparis* (below), actual size



A worker winter ant requests food from a replete.

ACORN ANTICS

Above the subterranean winter ant colony, among the leaves and branches on the forest floor, colonies of *Temnothorax* nest in acorns. Honey-colored *Temnothorax curvispinosus* is perhaps the most common of the several *Temnothorax* species occurring in North Carolina. The tiny ants find acorns that are intact, but already have a hole bored by a weevil larva. The colony, or just a solitary queen in search of a new nest, then moves in. Large colonies might spread themselves among several acorns, but for small colonies, perhaps most colonies, a single acorn is ample room. The ants are choosy: They prefer acorns with small holes over those with large ones, and acorns with large cavities (in which to live) over small ones. The ants find ample beetles, mites, springtails and bits of fruit to eat in the few meters around their acorn. Once a year, acorn ant colonies produce winged male and female reproductives that fly to find mates. Once mated, the female sheds her wings and looks for her own acorn in which to start a new colony. The male crawls away and lives his short life alone.

INVASIVE INHABITANTS

At the opposite extreme of the colonies of *Temnothorax curvispinosus*, which seldom number more than a few dozen individuals and are inconspicuous, are the large colonies of Argentine ants, fire ants and thick-needled Chinese ants. All three of these species are increasingly abundant, ecologically and economically problematic, and not native to North Carolina. They can have colonies with thousands or even tens of thousands of individuals and threaten native ants, sometimes birds, and even farms. Argentine ants and fire ants are both native to Bolivia, Brazil and Argentina. The thick-needled Chinese ants appear native to China and Japan, or perhaps Asia generally. These invasive ants cause trouble in urban and disturbed settings by being bothersome or economically costly, but in natural settings the problems they cause are more long lasting. They displace native ants, and thus leave undispersed the seeds that would be dispersed by native ants (including those of, for example, trilliums, violets and bloodroot), consume native invertebrates, and even, in the case of the fire ant, sting baby animals, sometimes to death. Whether by evolution of new traits, or simply by persistence, these ants advance a little further north each year, out of the warm climates to which they are native and into novel conditions. Unfortunately, climate change is aiding their spread.

FIRE ANT

THICK-NEEDLED CHINESE ANT

ARGENTINE ANT

The small trails of ants show these unwelcome visitors at actual size

Get Outside

Want to learn more about ants? Go turn over a log or a rock. As the ants scurry to reassemble their home, look down into their world. Shine a light into their deep tunnels. Make notes of what you see. Do the ants have a queen or do the workers produce eggs? Do they fly to mate? What happens in winter? How do they dig? How do they find and carry food? What do they do with their garbage or feces or their dead? Record when you see particular ants flying (it means you have discovered their mating time). Such records help scientists know how ant species and their behaviors change through time.

For detailed observations, ant colonies are easy to keep. Look through the books listed for information about how best to keep them. In any given ant colony, there is a high chance of finding collembolans (springtails), several species of which live, apparently, only with ants. Biologists have no idea yet what the springtails in ant colonies do. Find some and watch them; maybe you can find out. Put them in an aquarium with ants and see how they interact. Or, just watch them in the field. Do the ants pick the springtails up? Do they ever eat them? What do the springtails eat? How do the springtails defend themselves from the ants? Do the springtails ever ride the ants? And if you find out, contact ant researcher Rob Dunn (rrdunn@ncsu.edu) and let him know.

Read and Find Out

- "Journey to the Ants: a Story of Scientific Exploration" by E.O. Wilson and Bert holldobler, Belknap Press, 1994.
- "Earth Dwellers: Adventures in the Land of Ants" by Erich Hoyt, Touchstone, 1997.
- "Naturalist" by E.O. Wilson, Warner Books, 1995.
- "Ants" by Paul Fleisher, Benchmark Books, 2002.

In *Wildlife in North Carolina:*

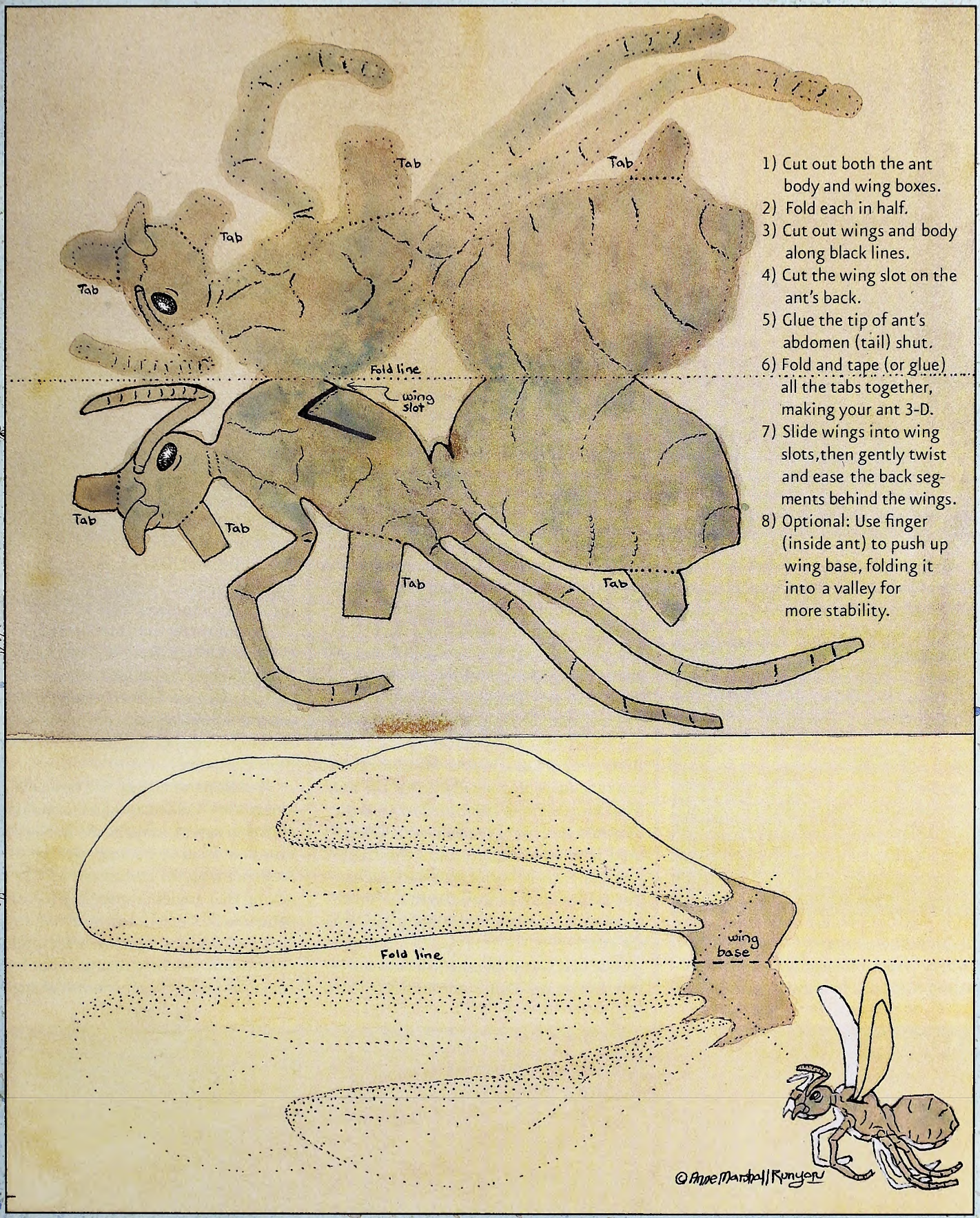
- "Workers of the World" by Harry Ellis, September 1994.
- "A Sisterhood of Ants" by Lawrence S. Earley, October 1996.
- "Fire in the Sand" by David Lee, October 1996.

On the World Wide Web:

- Information about the Ants of the World www.antweb.org
- Ants of North Carolina and Tennessee http://pick4.pick.uga.edu/mp/20q?guide=Ants&cl=GSMNP.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Winter Ant in Nuptial Flight



This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Snakehead Caught — and Released — in Catawba River

BOWFIN

NORTHERN SNAKEHEAD

With the reported catch and release of a Northern snakehead in the Catawba River in late spring, biologists with the N.C. Wildlife Resources Commission are urging anglers to be on the lookout for this exotic, predatory fish. If an angler suspects he might have caught a snakehead, he should freeze the fish or place it on ice, and report the capture to the Wildlife Commission at (919) 707-0220.

Biologists do not want anglers rereleasing a suspected snakehead because the species, which is native to Asia, has been known to displace native fishes in waters where it has been illegally introduced. An established snakehead population could reduce the abundance of popular game and nongame species.

Northern snakeheads are often mistaken for bowfins, but unlike native bowfins, they can have devastating impacts on resident fish communities by competing with them for food and habitat, preying upon them and transmitting disease.

Snakehead species can live out of water for limited periods of time and can survive in degraded habitats that normally would be unsuitable for native fishes. Once established in a body of water, they may become the top predator because of their large size and aggressive nature.

These potential negative impacts on existing fisheries, plus a similar reported sighting in Lake Wylie, led the commission to pass a regulation in 2002 making it illegal to transport, purchase, possess or sell live snakeheads in North Carolina. Despite the commission's proactive approach to keep the fish out of North Carolina waters, biologists with the agency and the U.S. Geological Survey were notified on May 17 about the catch and release of the Catawba snakehead.

Later that day, they confirmed that the fish reportedly caught in the upper Catawba River arm of Lake Wylie was a Northern snakehead. Biologists identified the fish from a photograph submitted by an angler who said he caught the fish, which measured 31 inches in length and weighed 13 pounds, near Belmont four days earlier. The angler mistakenly thought the snakehead was a bowfin and released it back into the river.

The best way to distinguish between the two species is to look at the anal fin, which is the bottom rear fin near the tail. The snakehead has a very long anal fin, which is more than half the length of the dorsal (back) fin, and has 18 rays. The bowfin has a shorter anal fin, which is less than half the length of the dorsal fin, and has 12 rays.

To confirm the existence of the fish in the Catawba River, commission biologists sampled the catch-and-release site, but found no Northern snakehead. Along with routine sampling, the commission is working to educate anglers and asking for their assistance.

"Public participation will be an effective tool in the Wildlife Resources Commission's efforts to assess snakeheads in North Carolina," said Jacob Rash, district fishery biologist with the commission. "We are asking that anglers report any fish they believe to be snakeheads. By acting responsibly and working together, anglers and the commission can help maintain our fishery resources for future generations of anglers."

IN SEASON

This month, these seasons are open in North Carolina:

Canada Goose: Sept. 1–29.

Crow: Wednesday, Friday and Saturday of each week between June 1, 2007, and Feb. 29, 2008, plus Labor Day, Thanksgiving and Christmas.

White-tailed Deer: Eastern, Central and Northwestern bow and arrow seasons open on Sept. 8. Western bow season begins on Sept. 10.

Mourning Dove: Sept. 1–Oct. 6.

Rails, Gallinule and Moorhen: Sept. 1–Nov. 9.

There is no closed season or bag limit for groundhog, coyote, striped skunk and nutria, except that nutria may not be shot in Currituck County during open seasons for migratory waterfowl. There is an open season for taking beaver with firearms during any other open season for the taking of wild animals.

Check the *2007–2008 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

What Frog Was That?

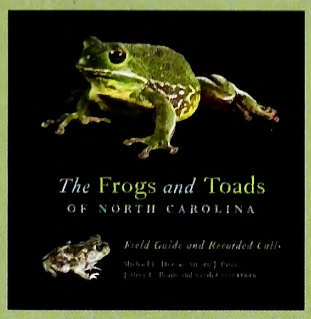
To help people identify and learn more about the frogs and toads calling from the woods, around ponds and wetlands and in their back yards, the N.C. Wildlife Resources Commission has available a new educational product, "The Frogs and Toads of North Carolina Field Guide and Recorded Calls."

The 88-page field guide with CD, which sells for $15, features audio calls and 120 color photographs that illustrate the 30 frog and toad species native to North Carolina. Detailed descriptions of each species simplify identification, and range maps identify where they are found in the state. The fascinating frog facts will appeal to every aspiring herpetologist eager to learn more about these remarkable amphibians.

NCWRC

SOUTHERN LEOPARD FROG (*Rana sphenocephala*)

Michael Dorcas, associate professor of biology at Davidson College and a well-known herpetologist, co-wrote the book with Jeff Beane, collections manager with the N.C. Museum of Natural Sciences; Steven Price, a research coordinator with Davidson College Herpetology Lab; and Sarah Cross Owen, a former herpetologist with the commission. It was produced by the commission's divisions of Wildlife Management and Conservation Education.



Currently, the field guide and CD can be purchased four ways:

- Go to the commission's N.C. Wild Store at www.ncwildlife.org.
- Visit one of the commission's three education centers, located in Corolla, Raleigh and Brevard.
- Call 1-866-945-3746.
- Mail a check or money order (no cash please) to: N.C. Wild Store, 1710 Mail Service Center, Raleigh, N.C. 27699-1710.

Proceeds from the sales of the field guide and CD will support Wildlife Diversity and conservation education projects and programs, such as the Calling Amphibian Survey Program and Becoming an Outdoors-Woman.

ON PATROL

Officer Kenneth Cook and Sgt. Mitchell Kirkland had received a report of a deer in captivity. With search warrant in hand, the officers arrived at the scene to look for the animal. Their search revealed that the animal was not in captivity; the animal could come and go as it wanted.

The homeowner, who was very cooperative, had raised the deer from a fawn and it had become a pet. He would leave his front door open and the deer would come inside when it wanted. The homeowner also had provided an open shelter outside with a pan of corn for the deer to eat.

If you're riding around Cleveland County you might well come across this particular deer. It will be wearing a bright orange collar and responds to the name of "Bucky."

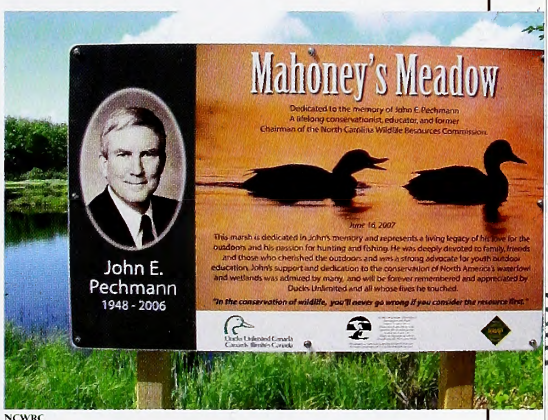
ILLUSTRATED BY JACKIE PITTMAN

DU Canada Honors Pechmann

North Carolina and Nova Scotia, Canada, have always shared one thing in common — the migratory waterfowl that call both places home for half the year. Now, they're celebrating another connection — the lasting influence of conservationist John E. Pechmann.

A former chairman of the N.C. Wildlife Resources Commission who passed away unexpectedly in July 2006, Pechmann was recognized on June 16 for his environmental stewardship when Ducks Unlimited Canada dedicated a protected marsh in his honor. Mahoney's Meadow, which now bears a sign honoring the longtime conservation advocate, serves as a breeding ground for ducks and geese. There, among the wetland grasses and healthy waters, birds spend the summer raising their young. When fall's cool weather begins to arrive, the waterfowl fly south for the winter. Many ultimately reside in North Carolina before heading north again come spring.

For this reason, Pechmann saw the importance of protecting these Canadian marshes in the interest of the waterfowl and the Tar Heel state. Current



NCWRC

commissioner Durwood Laughinghouse, who attended the dedication, said Pechmann would have approved of the conservation work taking place in Nova Scotia.

"He would've been very, very pleased," said Laughinghouse. "He would've applauded their efforts and encouraged them to continue doing more. When I was sworn in [as a commissioner] Pechmann said, 'Always put the resource first and you cannot go wrong.' If he'd been at Mahoney's Meadow last Saturday he would've said, 'You're on the right track. We just need to keep it up.' "

CALENDAR OF EVENTS

FRIDAY–SUNDAY, SEPTEMBER 7–16

Enjoy the livestock exhibits, midway rides, entertainment and the N.C. Wildlife Resources Commission's exhibit, including the Mobile Aquarium and Safari Trailer, at the N.C. Mountain State Fair in Fletcher.
Visit www.mountainfair.org.

SATURDAY–SUNDAY, SEPTEMBER 8–9

Check out the Currituck Wildlife Festival at Currituck County High School in Barco. The show features decoy carvers, wildlife painters, exhibits and decoy collections.
Visit www.mycurrituck.com.

SATURDAY, SEPTEMBER 15

Explore Hatteras Island's traditions and the world of working watermen during Day at the Docks in Hatteras Village. Festivities run from 10 a.m. to 5 p.m., followed by the blessing of the fleet.
Visit www.dayatthedocks.org.

SATURDAY, SEPTEMBER 15

Learn about insects at BugFest 2007 at the N.C. Museum of Natural Sciences in Raleigh. Event features exhibits, activities and presentations on insects.
Visit www.naturalsciences.org.

FRIDAY–SATURDAY, SEPTEMBER 28–29

Learn about trapping at the N.C. Trappers Rendezvous at the Johnston County Livestock Arena in Smithfield. An archery contest, live snakes, food and games for children are among other attractions.
Visit www.ces.ncsu.edu/johnston.

FRIDAY–SUNDAY, SEPTEMBER 28–30

Enjoy a tasty spot dinner, plus other food, and view a variety of arts and crafts at the 44th N.C. Spot Festival in Hampstead.
Visit www.ncspotfestival.com.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

Lake Raleigh Reopens to Fishing

While Raleigh may be growing by leaps and bounds, there are still a few quiet places where people can cast a line, kick back and wait for something to bite. One such place reopened on June 16. Lake Raleigh, which had been closed to the public since a breached dam drained the lake in 1996, officially opened after a kids' fishing event and pier dedication ceremony were held earlier in the day to commemorate the reopening.

The lake, owned by N.C. State University and located on its Centennial Campus, is the latest addition to the more than 50 public fishing areas the N.C. Wildlife Resources Commission maintains across the state. As a new public fishing area, Lake Raleigh has accessible piers, cleared banks, cut-and-cabled trees and a paved parking lot.

PHOTOGRAPHS BY JODIE OWEN / NCWRC

More than 70 children joined in the fishing at the Lake Raleigh reopening.

The lake's two wooden, floating piers, boat ramp and dock provide accessibility for anglers of all abilities. A wildlife-viewing pier extends 26 feet from the shore with a 48-foot T-structure at the end, and a fishing pier extends 48 feet from the shore, ending with a 32-foot long T-structure and low, angled handrail sections that provide easy access for fishermen confined to wheelchairs.

The boat ramp and dock can be used to launch nonpowered watercraft, including canoes, kayaks and car-top john boats. Motorized watercraft, including boats with electric trolling motors, and boats on trailers are not allowed.

In early June, commission staff cleared the banks of underbrush, trimmed low-hanging branches from shoreline trees and cut and cabled trees along the banks to enhance fishing opportunities near the piers and ramp.

A universally accessible parking area has space for seven vehicles and provides access to all portions of the site. Additional parking is available behind the Partners I building, located on the corner of Main Campus Drive and Research Drive. A parking permit, which can be obtained at the visitors' booth on Varsity Drive near the Avent Ferry Drive entry to Centennial Campus, is required during normal business hours.

More than 70 children spent the morning of June 16 casting for bluegills, largemouth bass and channel catfish at the free fishing event, which was sponsored by N.C. State University and the commission.

As indicated by the catch during the kids' fishing event, a variety of fish inhabit the lake. N.C. State University students sampled the 90-acre lake in July 2006 and found 17 different fish species, including largemouth bass, bluegills, redear sunfish, black and white crappies, warmouths, gizzard shad, threadfin shad, golden shiners, bullheads, channel catfish, and white catfish.

The lake is open from sunrise to sunset, seven days a week, and state harvest regulations apply: no limit on crappies, bluegills and other sunfish; and a daily creel limit on largemouth bass 14 inches and longer of five per day, except that two may be less than 14 inches. Anglers ages 16 and over must have an inland fishing license.

For more information on Lake Raleigh access and user guidelines, call the university's Centennial Campus Development Office at (919) 513-7961.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accampany applicatians for infant and yauth licenses. Birth certificate documentation cannat be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & troat waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfawl stamp must be purchased separately far all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ **I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____.** *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ **Lifetime Magazine Subscription to** *Wildlife in North Carolina* **$150**
(Please allow up to 6 weeks for your subscription to begin.)

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

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Make checks payable to: *Wildlife Endowment Fund*
A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

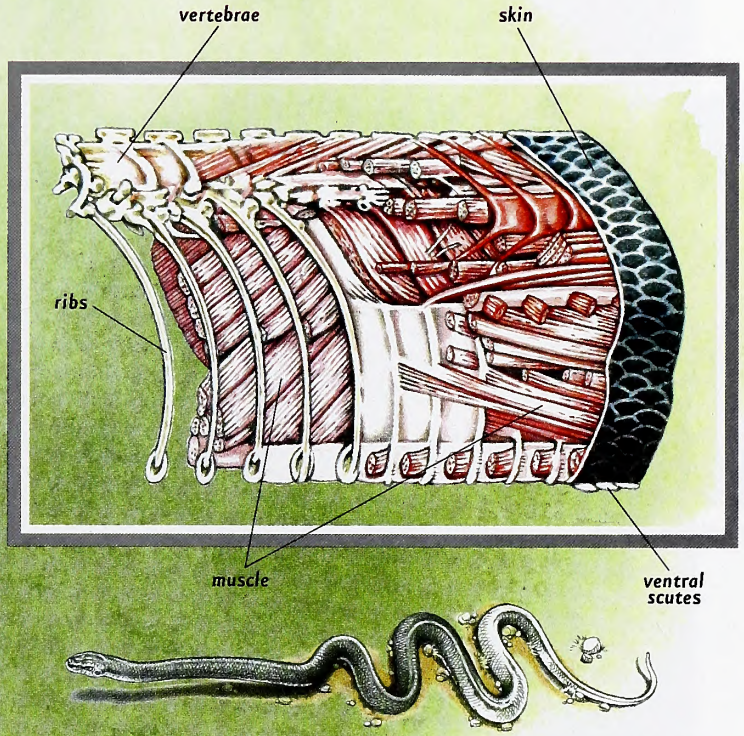
How Can Snakes Move So Quickly Without Limbs?

written by Jeff Beane
illustrated by Jim Brown

SNAKES DEAL WITH LIMBLESSNESS in some remarkable ways. Their flexible skeletons include several hundred vertebrae, each with a pair of ribs connected to neighboring pairs by a complex muscular system. Their skin also connects to their skeletons via many tiny muscles, and their large, transverse ventral scutes (belly scales) provide traction. Snakes can selectively contract and relax thousands of individual muscles, permitting great flexibility of movement.

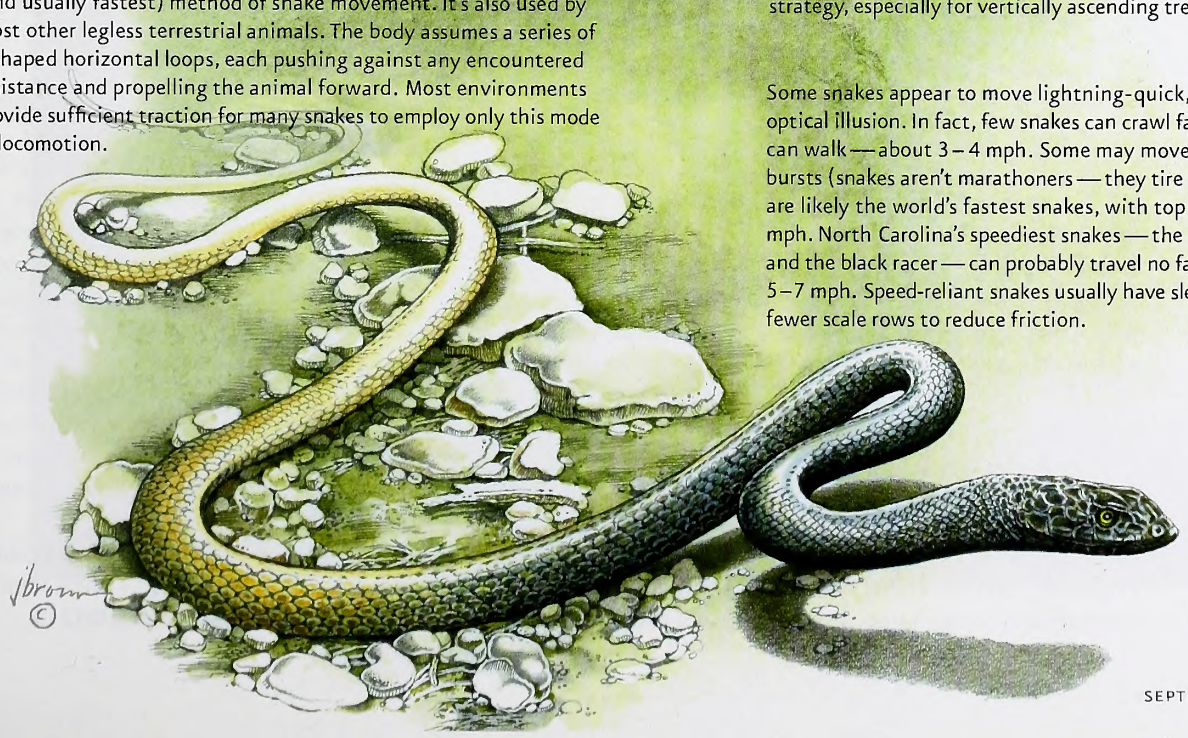
Rectilinear (or "caterpillar") movement involves a snake using its body musculature to sequentially lift portions of its ventral scutes, anchor them against the substrate and push its body over them in a flowing fashion, resulting in its slowly inching forward in a straight line. Heavy-bodied snakes like pythons and rattlesnakes often move in this manner. It's also useful for moving in narrow burrows.

Serpentine movement, or lateral undulation, is the most common (and usually fastest) method of snake movement. It's also used by most other legless terrestrial animals. The body assumes a series of S-shaped horizontal loops, each pushing against any encountered resistance and propelling the animal forward. Most environments provide sufficient traction for many snakes to employ only this mode of locomotion.



Concertina locomotion is accomplished by alternately anchoring the posterior of the body and extending the anterior portion, then anchoring the anterior and drawing the posterior forward after it like folds of an accordion. Climbing snakes frequently employ this strategy, especially for vertically ascending tree trunks.

Some snakes appear to move lightning-quick, but this is partly optical illusion. In fact, few snakes can crawl faster than a person can walk — about 3–4 mph. Some may move faster for short bursts (snakes aren't marathoners — they tire quickly). Mambas are likely the world's fastest snakes, with top speeds of 10–12 mph. North Carolina's speediest snakes — the Eastern coachwhip and the black racer — can probably travel no faster than about 5–7 mph. Speed-reliant snakes usually have slender bodies and fewer scale rows to reduce friction.



Many Hearts

written by Jim Dean

The compulsion to collect things is probably born of nostalgia, and many of us are afflicted. I have collected pocketknives, fishing lures, arrowheads, iron frying pans and, strangely, colanders. I didn't set out to collect colanders, but I kept seeing these handsome old strainers at antique shops and yard sales, and before better judgment prevailed, I owned nearly a dozen. I use the colanders and skillets when I'm cooking, and their appeal is closely linked to another more or less inadvertent collection — dilapidated cabins.

JIM DEAN

September at the farm.

I never set out to collect old cabins, either, but I calculate I have at one time or another owned, rented or otherwise had easy access to at least six or seven cabins (currently only three, not including my permanent home that some suggest fits in all too well).

My grandfather Will Dean introduced me to the charm and value of such places more than 50 years ago when I began to accompany him on trips to his own fishing shacks. One was on an old millpond 20 miles from his home in Halifax County, while the second was built over the water in the remote mouth of the Little Alligator River. Typically, Grandpa had very little invested, and often shared costs with his fishing buddies. These were wonderful places if you didn't mind primitive toilets, cooking on camp stoves, sleeping on lumpy cots, drinking rainwater and communing with mosquitoes, spiders and moccasins.

"Oil lamps and water jugs deferred the need for electricity and running water, and this has also reaffirmed my suspicion that an indoor bathroom is an expendable asset."

When my grandfather died in 1968, access to his camps passed with him — the Alligator River cabin had already slumped into the water, and all but the spindly outhouse disappeared within a few years. But he had taught me a useful lesson. If you're not picky, you can assemble an empire of very affordable and widely scattered outposts on some of nature's most appealing backwaters.

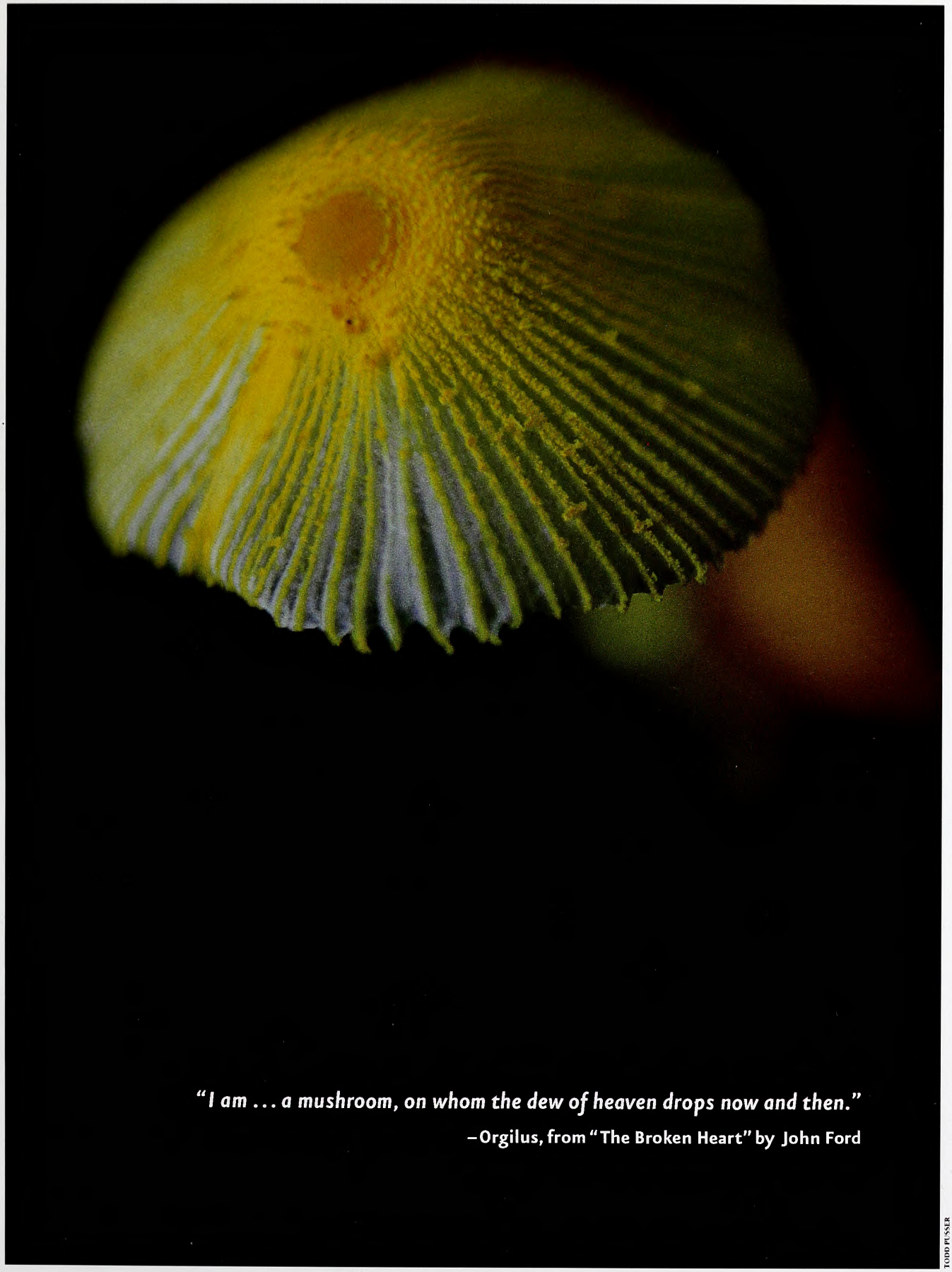
My first venture into cabin stewardship came about when Tom Cooper and I persuaded Archie Coffey to rent us a tiny frame shack overlooking Wilson Creek. Archie insisted on $10 a month. We cooked on a $12 Coleman two-burner, cooled our perishables in a 1940s Frigidaire, and kept a toilet seat hanging near the wood stove to carry to the outhouse in cold weather so that our exposed extremities would not freeze. For more than 30 years, we spent many happy days there while we fly-fished streams in the surrounding national forest for wild browns and rainbows. After we finally gave up this cabin, Tom acquired a replacement for his family and friends nearby — its toilet seat is attached to an indoor fixture, and the rest of the accommodations are also far more, well, commodious.

But I still have an old three-room unpainted tenant house that I renovated on my family's farm in 1992 to use as a rough camp. I've written before how Herbert Henley helped me replace windows and add front and back porches. I cleaned umpteen-jillion abandoned dirt dauber apartments off the walls and moved in, gradually filling it with attic castoffs. I found an old Home Comfort wood cook stove for the kitchen, and bought a Franklin stove for heat in the front room. Old calendars, tin signs and sporting prints were hung on the unpainted walls. Oil lamps and water jugs deferred the need for electricity and running water, and this has also reaffirmed my suspicion that an indoor bathroom is an expendable asset. Indeed, the lack of such a facility ensures that guests must be tolerant, resourceful, uncomplaining and feral — all admirable qualities.

I have spent many afternoons in the back porch hammock or drifting around in the ponds catching runty bluegills and the random largemouth. It is, to be sure, a lazy indulgence, especially since I inherited this particular privilege, and my role as a farmer has evolved to feeding most of our soybean crop to deer, sunflowers to geese, cypress and fruit trees to itinerant beavers, and bass to poachers.

Seeing what fun this is, my brother John and his wife, Beth, have recently begun repairing another derelict house nearby where a sweet lady named Minnie Hart had lived for many years. Minnie's house has been neglected since her death these past dozen years, but now it is filling up with old furniture and other yard sale delights. John, being more of a hunter than angler, has hung the walls with an impressive assortment of critters — deer and duck mounts, turkey and quail tails, deer hides and one moldy bear skin of uncertain origin. The kitchen is adequately equipped (especially with colanders), and John has repaired two old family rockers that sit overlooking a pond on a porch shaded by a magnificent maple.

And for the first time, we are going to name a cabin. This one will be called "Many Hearts." I think Minnie would approve, bear hide notwithstanding.



"I am . . . a mushroom, on whom the dew of heaven drops now and then."

–Orgilus, from "The Broken Heart" by John Ford

TODD PUSSER

OUTDOOR MOMENT

Inky cap mushroom

IN THE OCTOBER ISSUE

MIKE MARSH

WACCAMARVELOUS
Anglers looking for many species of fish in a gorgeous natural setting should give this classic lake a try.

HAS-BEEN HERRING
River herring once sustained an entire region. Now, it is uncertain if populations of these fish will ever recover.

WEIRD AND WILD
Albinism, melanism, multiple limbs and heads . . . what makes some animals look so strange?

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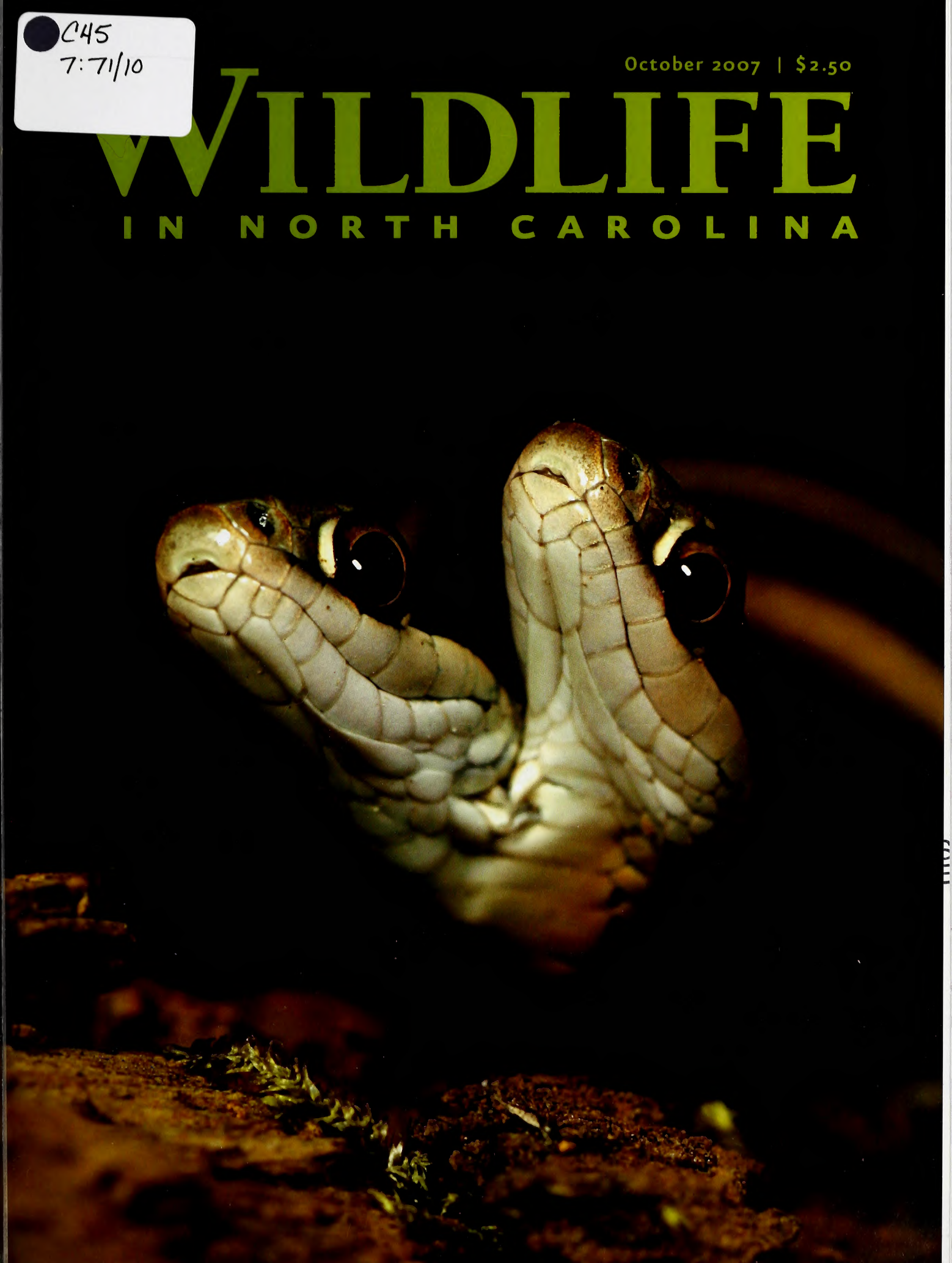
WILDLIFE IN NORTH CAROLINA



In Colonial times, one writer noted that herring were so numerous that rivers "stink of fish." Populations of herring have crashed over the last several decades. **PHOTOGRAPH BY TOM KNOBLOCH.**

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WILDLIFE IN NORTH CAROLINA

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Cover: Capture is just about the only way a two-headed snake can survive. If forced to feed itself, its heads may fight over which one will eat, or even attack one another. PHOTOGRAPH BY TODD PUSSER.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

Never let it be said that this magazine is afraid to look in-depth at important issues. Generally, we like to keep our longest stories to six or eight pages, but sometimes an issue is significant enough to use more space to tell the story. This month, we dedicate 12 pages to explore the problem of river herring.

If you live west of Interstate 95 and south of U.S. 264, it is likely that you have never tasted river herring. It is entirely possible you have never heard of river herring. Your unfamiliarity belies the huge significance the fish held in northeastern North Carolina for the better part of two centuries.

MELISSA McGAW/NCWRC

Until just a few decades ago, river herring represented life itself to many people in the Albemarle Sound and Chowan River corridor. The annual run of blueback herring and alewives, the two species lumped together and called river herring, meant guaranteed food stores for thousands of people all year long. In his story "Fish of Yesterday, Fish of Tomorrow" (page 20), associate editor Jim Wilson says that many people ate salted herring three meals a day.

Jim himself devoured hundreds of pages of information about river herring, including historical documents and the 311-page fishery management plan prepared by the N.C. Division of Marine Fisheries. He also attended several meetings of the Marine Fisheries Commission as it struggled to decide on a new policy governing the river herring fishery. In interviewing numerous biologists about the mystery of why populations of the fish have plummeted, Jim found that there are many solid theories but little consensus. The one fact biologists are in agreement on is that it will take a long time for river herring's historic abundance to return—if it ever does.

If it seems like much ado about a bony, oily fish that is used for very little these days aside from crab bait, I can't deny that. However, river herring's long, rich history in one far corner of the state, and the possible ecological consequences of the fish's decline, make it a subject very much worth discussing. Enjoy, and let us know what you think about the plight of the river herring.

Greg Jenkins

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WILDLIFE IN NORTH CAROLINA

OCTOBER 2007 VOLUME 71, NUMBER 10

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Fintastic

Thanks to Jay Barnes and *Wildlife in North Carolina* for bringing our attention to the often-misunderstood interaction between sharks and people in the recent article entitled "The Sharks of Summer" (Aug. 2007). Jay presents an excellent overview of the shark species that frequent our inshore waters, along with data that shows how water temperature, time of day and even the phase of the moon can play an important role in human-shark interactions.

As director of the North Carolina Aquarium at Pine Knoll Shores, Jay Barnes is in an excellent position to understand the misconceptions that many people have about sharks. On a daily basis, he interacts with visitors as they stand in awe of the 6-foot sand tiger sharks and other huge fish that roam the giant ocean tank in the aquarium. This "teachable moment" provides a perfect opportunity to convey the wonders of nature as well as a healthy respect for large ocean predators. This is what the three North Carolina Aquariums are all about.

We invite everyone to visit the Aquarium and to learn about our aquatic resources from the mountains to the sea. We hope to see you soon.

Neal Conoley
President
North Carolina Aquarium Society

All Heart

Congratulations on your fine magazine, from which I have learned much in my first year here in North Carolina. At the same time, though, I have a suggestion for your consideration. On page 7 of "The Silent Predator" in your August issue is an illustration representing a deer seen through the crosshairs, with the hunter's heartbeat portrayed across the scene. In common practice, one would now shoot and hit the deer far from the heart.

In my long-ago experience with deer and hunters, I found that the location of the buck's heart was not widely known, which led to many a misplaced shot. So I ran a frozen buck through a band saw at the University of California-Berkeley Medical School and had an illustrator draw the actual anatomy.

Let's hope that North Carolina hunters are more knowledgeable about anatomy than those in California were! Keep up the good work.

Dick Taber, Ph.D.
Emeritus Professor of Wildlife Science
University of Washington-Seattle
Salisbury

With his letter, Professor Taber enclosed his 1957 report that included the diagram produced by his icy dissection of a black-tailed deer. The drawing shows a side-view internal cross-section with most internal organs and structures shown and labeled. He is correct that if a hunter were to squeeze the trigger with the crosshairs placed as indicated on page 7, the likely result would be a gut-shot deer that could escape and possibly die slowly. Of course, as the professor is aware, the illustrations accompanying this story were of a highly conceptual, somewhat surreal nature and were not intended to represent best practices for hunting whitetails. For proper hunting techniques and strategies, please refer to the companion stories "Deer Hunting 101" and "Deer Hunting 102" which were published in the October and November 2005 issues, respectively.

Mayo Rising

The article on the Mayo River that appeared in August issue of *Wildlife in North Carolina* magazine ("Hidden in Plain Sight") was one of the contributing elements to the City of Eden's presentation to the American Canoe Association in our attempt to have this organization relocate to our city. We circulated this article to its board members prior to its decision.

Although Eden was not selected, we have established a new relationship with this organization that will be for our mutual benefit. They have expressed a sincere desire to partner with Eden and Rockingham County in future events.

The *Wildlife in North Carolina* article was an excellent piece that finely illustrated what is happening here with river recreation. I speak for the City of Eden and Rockingham County residents in thanking your magazine for this very impressive article.

Mike Dougherty
Director of Business Development
City of Eden

Photo Exposure

I read somewhere that *Wildlife in North Carolina* is sponsoring a photo contest, but I haven't seen anything about it in the last couple of issues. How can I find out what the rules are so I can enter this contest?

James Tandy
Piney Green

I am afraid that you missed the deadline for this year's competition, James.* The Wildlife in North Carolina *2007 Photo Competition closed on Sept. 14 of this year, with the winning photos to be showcased in the January 2008 issue. However, don't get too discouraged. There is always next year's competition. Keep an eye out in the pages of this magazine for information on next year's competition.

We Want Your Feedback

Do you have a comment about content in *Wildlife in North Carolina?* Questions about something you read or have seen? Send us an e-mail at letters@ncwildlife.org. We would love to hear from you!

write us

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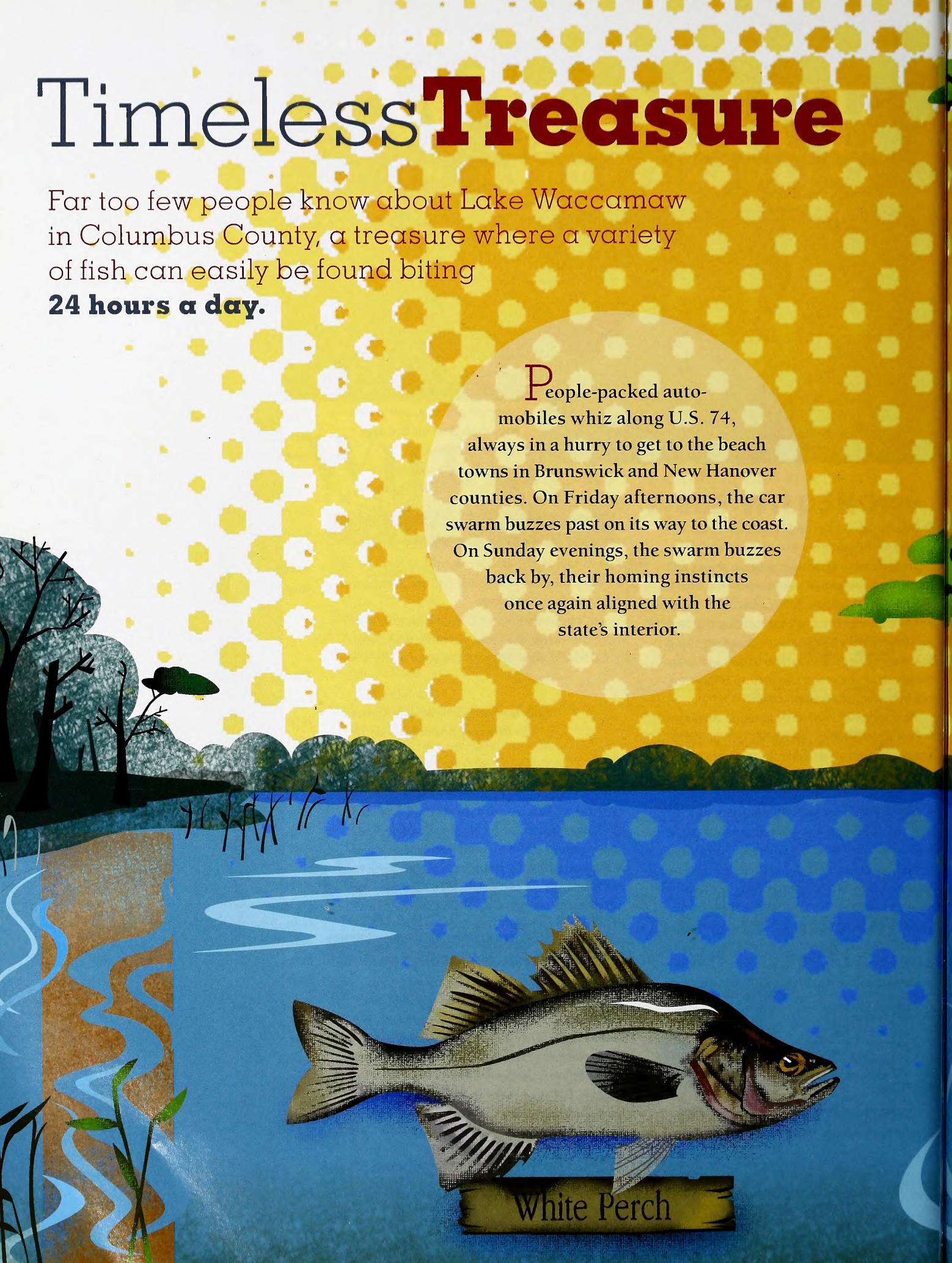
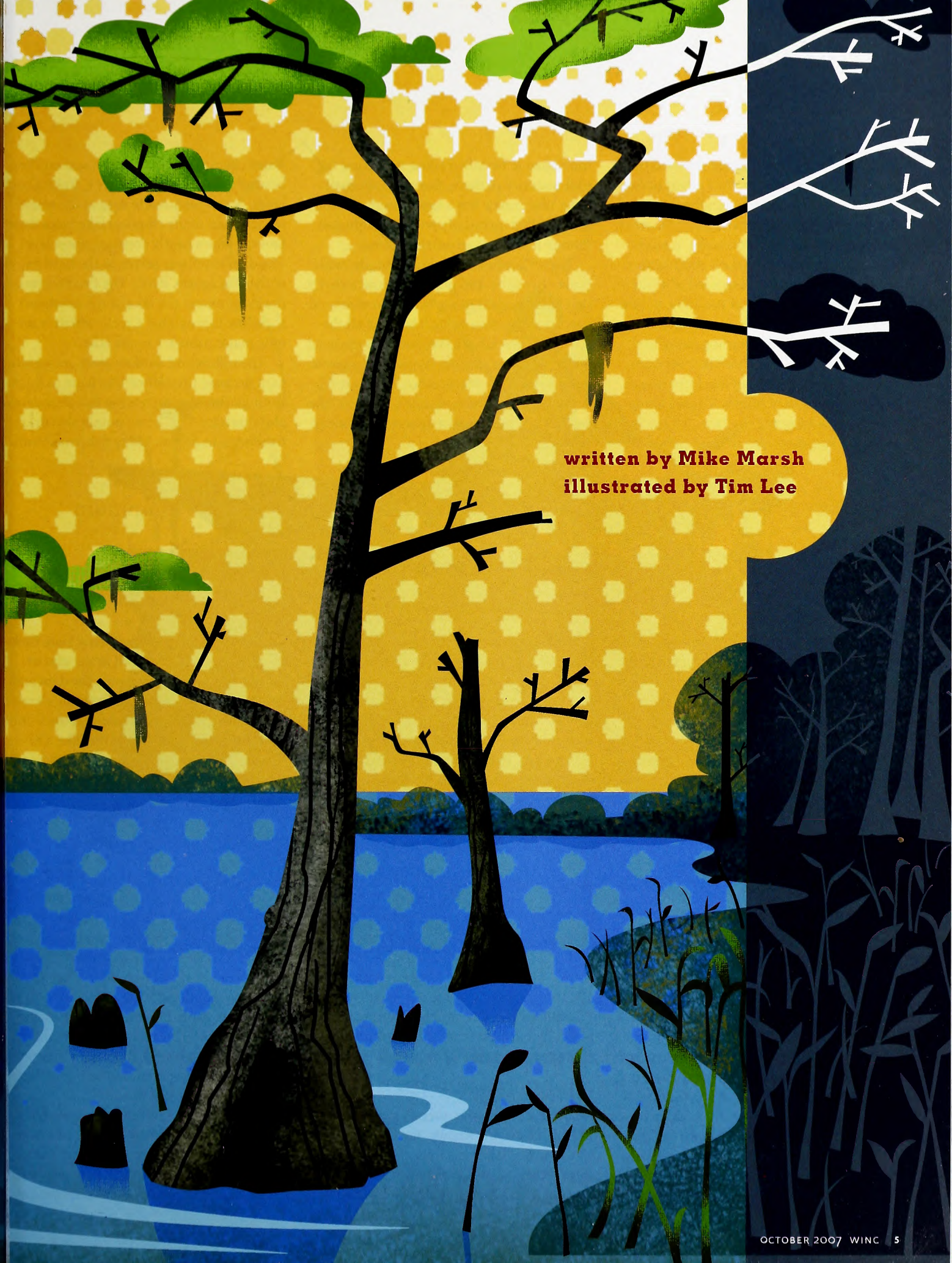
Timeless Treasure

Far too few people know about Lake Waccamaw in Columbus County, a treasure where a variety of fish can easily be found biting **24 hours a day.**

People-packed automobiles whiz along U.S. 74, always in a hurry to get to the beach towns in Brunswick and New Hanover counties. On Friday afternoons, the car swarm buzzes past on its way to the coast. On Sunday evenings, the swarm buzzes back by, their homing instincts once again aligned with the state's interior.





written by Mike Marsh
illustrated by Tim Lee

But if those frantic drivers swiveled their heads for just an instant, they might notice the name of a town painted on the water tank that towers above the south side of the road. If they made that tiny movement, it might just encourage them to take a short detour and discover a shimmering jewel of a lake located just a mile south of the traffic torrent.

The town of Lake Waccamaw takes its name from the lake. Winding along the northern and western shoreline, the community consists mostly of lakefront homes and a second tier of homes located along paved roads rimming the lake. All roads along the lakeshore lead to dead ends, likely leading most folks outside Columbus County to believe the lake is nothing more than an afterthought. There are no main highways passing around the perimeter, and few know the quiet serenity of the state's largest Carolina bay lake.

Therefore, visiting Lake Waccamaw requires purpose of intent. My wife, Carol, and my son Justin, along with many of our fishing friends, visit the lake many times during the year. Though everyone in our coastal hometown of Wilmington asks why we want to travel so far inland to fish in a small lake when we have an entire ocean essentially in our front yard, the answer comes easily for us. The scenery is beautiful, and the fishing is fantastic.

A UNIQUE DISTINCTION

Lake Waccamaw is unique among the state's Carolina bay lakes. Although it is not the largest natural lake, it is nevertheless, according to a display at the Lake Waccamaw State Park Visitor's Center, the largest Carolina bay lake in the state at nearly 9,000 acres.

Carolina bays are so named for the several species of bay trees — including sweet bay, red bay, swamp bay and loblolly bay — that live in those Carolina bays not sufficiently inundated to be called lakes, which are the vast majority of them. But the bottom of Lake Waccamaw has a low enough elevation to stay filled, primarily with groundwater, though it also has an outside source.

Each Carolina bay lake is unique, with water chemistry and physical characteristics that have resulted in the evolution of several species indigenous to each lake. Of all the state's bay lakes, Lake Waccamaw is the most fertile, resulting in more species and a greater abundance than in any other. There are 52 species of game and nongame fish in the lake, including some smaller species that occur nowhere else.

The reasons for the above-average fertility of the lake lie in limestone bluffs located along the lake's northern shoreline. The limestone neutralizes the natural acidity of the water, which is present in most typical Carolina bay lakes, often resulting in few game fish species. This results in a preponderance of acid-tolerant species such as bowfin and chain pickerel, which are also called jack or jackfish. Though these toothy predators also swim in Lake Waccamaw, largemouth bass are exceedingly abundant there due to the lake's lack of acidity in the water.

Anyone who has applied lime to a garden, lawn or agricultural field knows the importance of neutralizing the acidity of the soil to increase nutrient uptake by desirable plants. The same thing happens with water, and the naturally neutralized waters of Lake Waccamaw result in numbers of species and individual fish that can be more than double those of other Carolina bay lakes.

ON THE WATER

Nearly everyone who attends grade school in North Carolina knows that the origin of Carolina bay lakes is a mystery. However it was created, Lake Waccamaw was born in a great location. Not only does it have good water chemistry, it has inflow and outflow beyond rainfall, unlike other Carolina bay lakes. A low man-made dam at the southwestern part of the elliptical lake helps maintain the lake's nearly constant water level. The dam's spillway serves as the headwaters of the Waccamaw River. The Friar Swamp drainage enters the lake at the northeast shoreline through Big Creek, which is the only major tributary to the lake.

The inflow and outflow areas are significant because they allow nutrients to flush through the lake, increasing fish abundance and diversity. These two points also draw fishermen in droves. Many fishermen walk the bank at the Lake Waccamaw State Park property, which is located at the end of Waccamaw Shores Drive near the dam and spillway. Some people fish from the dam or walk across the dam to wade-fish the 5-mile trail along the south side of the lake. Others slide small boats into the water near the spillway, fishing float rigs from cane poles for panfish and perch.

Wading fishermen can also drive east along Bella Coola Road past the park's visitor center to the campground, where a dock with large overhead shelter offers shade and protection from rain for wading fishermen who may get caught by the elements. The area around the dock offers waders a blue-heron's-eye view of the expansive grass beds on either side. From them, anglers can spot largemouth bass and redbreast, bluegill and redear sunfish, which are also called shellcrackers by local anglers. Most anglers don't care which sunfish species they are catching and simply lump them together under the category of bream.

Anglers with boats often can launch them at the Columbus County Access Area near the state park visitor center. A canal connects the ramp to Big Creek, giving access to the lake. Another option is launching at

More than once, as we were launching or retrieving our 16-foot aluminum johnboat from one of the ramps, someone has asked, **"Are the white perch biting?"**

Of all the state's bay lakes, **Lake Waccamaw** is the most fertile, resulting in more species and a greater abundance than in any other.

the N.C. Wildlife Resources Commission boating access area on the west side of the lake on Canal Cove Road. It's important to know the location of both ramps because relatively low-velocity winds stir the lake, creating some big waves. I've watched as anglers attempted to retrieve boats at the Wildlife Commission ramp during an east wind, with three sinking from waves washing over their transoms. If the wind is out of the east, it's better to use the Columbus County ramp when possible. If the wind is out of the west, the better choice is launching and retrieving boats from the commission ramp.

The lake is shallow, averaging 7 feet in depth, with a sandy slope toward the shoreline. Firm footing and clear water invite wade-fishing. Fishing with a fly rod is extremely productive, with an old standby, the yellow popping bug, a good choice for catching largemouth bass and panfish. For those who can't use a fly rod or on windy days, spinning or baitcasting gear works equally well. Topwater lures, spinnerbaits and soft plastic lures rigged to float or for bottom fishing work well for catching largemouth bass. Small beetle grub spinners and inline spinners, along with live baits like worms and crickets fished on float rigs, attract all of the sunfish species.

In the open water, anglers with boats troll spoons, small swimming plugs and spinners to catch the mainstay panfish of the lake —white perch and yellow perch. The yellow perch are called redfin or redfin perch but may also be nicknamed raccoon perch or goggle-eye perch. It pays to know the local jargon so that if you speak with fishermen you know exactly what they are catching.

White perch form large schools in the deeper-water areas of the lake, which can exceed 9 feet. When the fish are in the deeper holes, anglers can spot them with electronic depth finders. However, a side-scanning sonar is a better choice for finding schooling fish in the shallow water.

Sometimes perch feed at the surface. When anglers spot the action, sight-fishing becomes the most exciting way to catch them. White perch strike fly rod poppers and small, flashy flies. But they will also readily attack spoons, spinners and small crankbaits cast with ultralight spinning rigs with a vengeance. Of all the fish in the lake, food-fishing folks try catching white perch more than any other species. More than once, as we were launching or retrieving our 16-foot aluminum johnboat from one of the ramps, someone has asked, "Are the white perch biting?" instead of the standard for other waters: "Did you catch anything?"

In spring and fall, black crappies bite inside the lake as well as in the canal system along the edges of the lake. Some canals are private, but others, like the canal along Bella Coola Road, can be accessed from the right-of-way by any angler with a cartopper. Dabbling minnows on bobbers is a popular way to catch a "mess" of crappie in the canals or in the lake. Most people avoid fishing the canals during warmer months, intimidated by the alligators seen sunning along the banks.

FISH AROUND THE CLOCK

Our favorite way to fish the lake is to head out prepared for whatever is biting. Launching at daylight, we use a trolling motor to stalk the edges of the grass beds and cast into the shadows beneath the hundreds of boat docks extending into the lake. Cypress trees and lily pad beds create other visible structure, and any or all of this structure attracts largemouth bass on a given day.

We work topwater lures like the Devil's Horse and Zara Spook along the structure,

attracting not only bass but also bowfin and jackfish. As the sun moves overhead, the bass fishing shuts down. Switching to ultralight spinning tackle typically brings on the panfish, which patrol the same areas where the bass develop a bad case of lockjaw with increasing daylight.

White perch and yellow perch tease us, attacking lures that were cast for panfish, and occasionally even going after some big bass lures. But as the day advances and the sun slowly moves farther overhead, taunting time is over. It is time for a showdown at high noon.

Groups of bubbling disturbances pockmark the surface, the telltale feeding signs of white perch. Switching beetle grub lures for inline spinners, we troll for white perch, often catching brilliantly colored yellow perch as a bonus species, along with the occasional wrist-wrenching strike of a bowfin that had been feeding on the smaller schooling fish.

Afternoon fishing is a reverse format until, as the weakening sunlight backlights cypress trees and casts dark shadows on the crystal water, we are again twitching topwater lures or fly-rodding popping bugs, enticing bass with one final cast.

Many of Lake Waccamaw's piers house pontoon boats because the large, stable craft are excellent for enjoying the scenery as well as for fishing. Pontoon boats' anchor lights dot the growing darkness, with laughter emanating from the same locations, drifting across the stillness to the ear. A shout of a hookup, then a whoop of success, precedes the sound of a big fish's tail swatting a pontoon boat's deck. We're reminded Lake Waccamaw's fish bite 24 hours per day, making it a tough decision to ever leave its quiet waters.

"Shall we join the catfishermen?" Carol asks. "Or are we done? Sooner or later, we have to head home." ◆

Wilmington writer Mike Marsh is a frequent contributor to Wildlife in North Carolina.

Groups of **bubbling disturbances** pockmark the surface, the telltale feeding signs of white perch.

Lake Waccamaw State Park History

John Bartram, a renowned colonial botanist, gives discussions of the area in his "Diary of a Journey Through the Carolinas, Georgia and Florida from July 1, 1765, to April 10, 1766." Lake Waccamaw is specifically mentioned in "A New Voyage to Georgia by a Young Gentleman" in 1737. The gentleman states, "I think it is the pleasantest place that ever I saw in my life." But he was not the first to find this paradise.

Archeologists have discovered evidence of American Indian civilization at Lake Waccamaw dating back thousands of years, in addition to artifacts from the Waccamaw-Siouan tribes. In 1797, the state deeded 170,120 acres of the nearby Green Swamp to Stephen Williams, Benjamin Rowell and William Collins for little more than $7,000. A portion of the land was drained for agricultural use, but in 1904 the property was purchased for timbering. Lumber companies produced cypress shingles and shipped them by boat across Lake Waccamaw for transport by mule to the nearby train station. Logging and shingle transportation eventually became rail based, and a line was laid along the west side of the lake. Remnants of the railway bridge crossing can still be seen today.

State government interest in the bay lakes first emerged in the early 1800s, when legislation blocked further private claims on land that was covered by lake waters. Later, the General Assembly declared that any lake of 500 acres or more in Bladen, Columbus or Cumberland county shall remain the property of the state.

In October 1964, the Board of Conservation and Development tried to obtain land on the Waccamaw lakeshore to establish a state park. But it wasn't until May 1976 that a state park was formed on the lake, when a 273-acre tract of land was purchased by the N.C. Division of Parks and Recreation. Additional land purchases in the mid-1980s, including acreage formerly belonging to the Federal Paper Company and Georgia-Pacific Corporation, helped bring the park to its present size of 1,732 acres.

For more information, contact Lake Waccamaw State Park, 1866 State Park Drive, Lake Waccamaw, NC 27450; (910) 646-4748; www.ncsparks.net/lawa.html.

Source: N.C. Division of Parks and Recreation

written & photographed by TODD PUSSER

STEP RIGHT UP!

STEP RIGHT UP!

SEE THE WHITE SQUIRREL AND THE TWO-HEADED TURTLE! WHAT MAKES SOME ANIMALS STAND OUT IN STRANGE WAYS?

October is a month of change. Ushering in autumn, the days grow shorter, the air becomes crisper and the leaves on the trees change color. In the middle of the month, the N.C. State Fair comes to Raleigh, bringing its assortment of amusements and oddities. October is also a time when children dressed in costumes stir among carved jack-o'-lanterns on Halloween night.

In celebration of the weird and wonderful of October, I focused my camera lens on the animal kingdom, seeking the downright strange creatures that turn up from time to time in the state. Some of these creatures are so bizarre that they defy description. From ghostly white salamanders with pink eyes to a bullfrog tadpole with 13 legs to a two-headed snake, these images represent three years of tracking down reports of oddball animals across North Carolina.

DEFORMED BULLFROG TADPOLE

Amphibian deformities have been documented around the world, including North Carolina. Perhaps the most striking example from the state was a bullfrog tadpole collected in Lee County in 1937. The nearly transformed tadpole had an astonishing 13 legs and was so bizarre that it earned mention in "Ripley's Believe It or Not." The cause of such deformities has been linked to pollution, infection from parasites and ultraviolet radiation. This specimen was photographed in formalin at the N.C. Museum of Natural Sciences in Raleigh.

BICEPHALIC REPTILES

Two-headed (bicephalic) reptiles draw lots of attention and often make the news. Similar to human Siamese twins, bicephalic reptiles result from incomplete separation of a fertilized egg, often with the organism developing a single body with two heads. This genetic mutation is very rare in nature and generally results in the death of the animal at a young age. Two-headed turtles and snakes have turned up from time to time across the state and are represented here by two recent examples.

RIVER COOTER

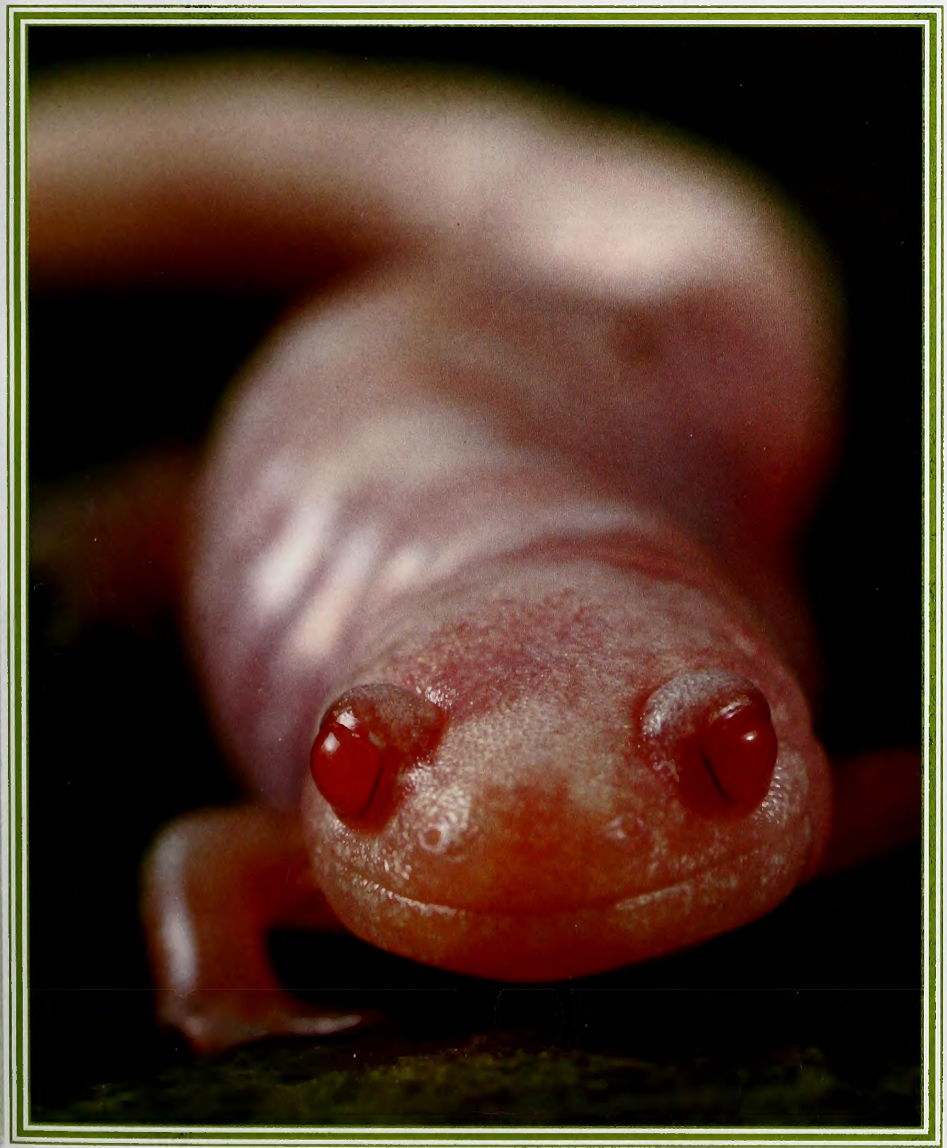
This turtle was found as a hatchling in a small pond in Wake County.

EASTERN RIBBON SNAKE

This unique snake was found near a small pond in Hyde County as a juvenile. It is the first time a two-headed Eastern ribbon snake has ever been found. The specimen is currently alive and well at the N.C. Museum of Natural Sciences, where it readily eats mosquitofish. The right head appears to be dominant and generally is the most eager to eat.

ALBINO ANIMALS

Walk into any taxidermy shop and chances are you will see a mount of an albino white-tailed deer or maybe even a gray squirrel or raccoon. For centuries, albino animals have captured human imagination. The Cherokee of western North Carolina considered them sacred. True albino animals lack skin pigment, or melanin, of any kind and are characterized by pink or red eyes. A lack of pigment in the eyes makes albino animals particularly sensitive to sunlight and the harmful effects of ultraviolet radiation. Albino animals rarely live long because their conspicuousness makes them more susceptible to predators. Albinism results from a recessive genetic mutation and has been calculated by some scientists to occur in one of every 40,000 births. Although uncommon, albinos have been recorded among a variety of species in North Carolina, from snakes to skunks and hawks to deer. Albinism has been documented in at least 21 species of reptiles and amphibians from the state. Here are some recent examples.



EASTERN COTTONMOUTH

This specimen was found as a small adult in Bertie County and is now housed at the N.C. Museum of Natural Sciences.

MARBLED SALAMANDER

This specimen was found as a larva in a vernal pool in Wake County and then raised to adulthood.

RAT SNAKE

This interesting specimen was found near Kill Devil Hills on the Outer Banks.

LEUCISTIC CREATURES

Leucistic animals are ghostly white. Like true albinos, they lack any pigment in their skin, feathers or fur. But unlike true albinos, they retain pigment in their eyes. Studies have shown that leucistic animals are not as adversely affected by sunlight as true albinos.

FOWLER'S TOAD

This toad was found as an adult in a backyard near Asheboro.

GREY'S TREEFROG

This unique frog was found as an adult in a hot tub in Wake County.

RED-TAILED HAWK

This bird was injured by gunshot and now resides at the Carolina Raptor Center near Charlotte.

GRAY SQUIRREL

Brevard is famous for its white squirrels, which frequent yards and parks around town. These squirrels are often referred to as albinos but are really leucistic, as many retain pigment in their eyes.

RUBY-THROATED HUMMINGBIRD

This bird was observed around a feeder in Randolph County, where it was captured and banded by hummingbird biologist Susan Campbell.

MELANISTIC ANIMALS

This genetic mutation is the opposite of albino and leucistic and is characterized by an abnormally high amount of melanin in an animal's skin. Often the animals are entirely black. This mutation is common in some species such as Eastern hognose snakes and fox squirrels, where black animals are often encountered in the field. In other species, this color variation is quite rare. Here are a couple of the rarer examples from the state.

SPOTTED SALAMANDER

This salamander was found crossing a highway on a rainy night near Robbins in Moore County. Compare it with a normal spotted salamander adult.

EASTERN GARTER SNAKE

This snake was found in Randolph County. Compare it with a normal-colored garter snake.

The Forgotten Persimmon

Possibly one of the most underappreciated fruits around, the wild berry known as persimmon can be a pleasant and delectable treat. However, be sure not to pick it off the tree!

written by Mark Joyner
illustrated by Chris Armstrong

PERSIMMONS AND I GO BACK A LONG WAY, stretching back to boyhood days spent on my grandparents' farm in the shadow of the Blue Ridge Mountains. In the fall of the year when wood smoke hung in the air and the first frosts had touched the countryside, my grandfather and I would visit the persimmon tree.

We'd go down a dirt road past the tobacco barn and up the hill to a tree that stood all alone in the pasture. It was a handsome if somewhat stunted hardwood, its dark red leaves of autumn nearly gone, the bare limbs heavy with the unusual orange fruits that had brought us out that day.

Against the sky they looked like plum-sized pumpkins, attached to the limbs by hard black caps. Only the coming of cold weather and full ripeness had persuaded their surrender, sending them to the ground where they could easily be gathered. The grass around us would be littered with the sweet morsels, and a gentle shake of the tree brought down still more.

Wisely left behind were the ones that refused to let go, and herein was the secret of the persimmon. The unripe fruit is indescribably awful, although the sensation has been compared to a mouthful of fur. Put simply, a persimmon hanging on stubbornly is nature's warning that some things just can't be rushed.

Confining ourselves to only the fallen fruit, we quickly filled our pails. As the chill of the evening began to settle in, we journeyed back home to my grandmother's kitchen with a harvest we had neither planted nor tended, but with which we had nevertheless been blessed.

Here the persimmons were gently washed and capped, and the hard seeds dealt with in a rather handy manner. A cone-shaped metal colander was mounted over a bowl, the fruit poured in, and a wooden pestle rolled round and round. The orange pulp came oozing out, leaving the seeds and skins behind.

With the pure essence collected, the real alchemy commenced. From the bins came flour and brown sugar, and from the cupboard exotic tins of cinnamon and clove. A dash or two of this and that was followed by milk and eggs, none of which had ever seen the inside of a store. Blended and beaten, the creamy mixture was poured into a buttered pan and slid into a hot oven. A rich aroma soon added to the pleasant smell of the woodstove.

Boys are quite willing to believe miracles happen, especially behind closed oven doors. How else to explain the wild berry (which it actually is) from the field emerging as a dark caramel delight? Baked into a pudding, the spicy fruit had gained a honeyed sweetness that was unlike any cake or pie I'd ever tasted. In it was all the flavor of the outdoors and the last days of summer, although it's unlikely I fully appreciated that at the time. Nor did I care that we were hardly the first to appreciate the persimmon.

An Already-Discovered Treasure

Four hundred years ago, Captain John Smith found that the Powhatan Indians in the Chesapeake Bay region enjoyed the *putchamin*, an Algonquin word for dried fruit. The drying process not only helped remove the bitterness but also preserved the fruit for winter use. The young men of the tribe were even seen playing a game of chance with the large seeds.

One hundred years later, explorer John Lawson trekked across the Carolinas, living among the numerous Indian tribes of this region until he was captured and killed by the Tuscarora along the Neuse River. In his journal of 1709, "A New Voyage to Carolina," he noted the persimmon to be much admired by American Indians. He also warned that the green fruit "draws your Mouth up like a purse, being the greatest astringent I ever met with."

The early settlers weren't about to overlook this valuable fruit, and enjoyed the persimmon fresh in puddings and pies, as well as dried along with figs and apples. This ready source of sugar was at times allowed to ferment and be converted into a potent brew as persimmon beer, brandy and wine. Dried and roasted seeds were sometimes used as a substitute for coffee, a common practice in the South during the Civil War.

An unusual incident during that time involved the persimmon and the legendary Confederate general Thomas "Stonewall" Jackson. Jackson's aide-de-camp William Kyd Douglas relates in "I Rode with Stonewall" that in the late fall of 1861, Jackson and his troops were on the move along the Potomac River. Suddenly, "the General spied a tree hanging heavy with persimmons, a peculiar fruit of which he was very fond." Taking a rare respite from his legendary marching pace, he rode his horse over to the tree and climbed up into its branches. Jackson somehow slipped into the crotch of the tree and found himself firmly stuck. His men filed by, gazing at the strange sight of their hardened commander calmly plucking and eating the plump fruit. Once his sweet tooth was satisfied, he had to summon several members of his staff to extract him from the tree. (Maybe it should be mentioned that Jackson was also known to suck on lemons and hold one arm aloft to equal out his circulation, eccentricities that possibly help explain why he thought persimmons still on the tree were a delicacy.)

Modern research has shown that persimmons have more fiber, important minerals and antioxidants than apples and are one of the most heart-healthy of all fruits. The tree itself is said to have medicinal uses, most of which relate to its natural astringency. The Catawba Indians boiled the bark in water to make a mouth rinse treatment for thrush, a fungal disease of the mouth and throat. Though it was said to be a cure for many ailments from warts to constipation, there was one thing it didn't do, and that was make your teeth black. That feat belongs to the notorious black persimmon of Texas, which, as its name suggests, bears a black fruit that stains hands, mouth and teeth with its dark dye.

Both these trees are members of the ebony family, which are noted for their extreme hardness and black or purplish heartwood. Around the sawmill, tough persimmon wedges were used to split logs. The wood takes an unusually high polish, lending itself to specialty items such as pipes and billiard cue sticks. There was a time when a handcrafted persimmon golf club head was considered top-of-the-line, although with changing American tastes and lifestyles, that day has passed.

Your Turn

Perhaps gone too are the days of boys and their grandfathers taking to the woods in search of the makings of a fine persimmon pudding. The fruit, whose scientific name, *Diospyros*, translates as "fruit of the gods," is now largely forgotten and left to four-legged foragers such as deer and raccoons. For those few folks who might just know where such a tree grows, however, I'm pleased to offer the very recipe that came from my grandmother's kitchen. If you give it try, I suspect you will become as much of a fan of persimmons as me.

Mark Joyner is executive vice president of the N.C. Aquarium Society and an occasional contributor to Wildlife in North Carolina.

Persimmon Pudding

(Recipe of Minnie Ola Cook, Harmony, N.C.)

2 cups squeezed persimmons (from about 2 quarts ripe fruit)
2 cups brown sugar
2 cups self-rising flour
2 cups milk
3 eggs
1/4 cup melted butter or margarine
1/3 tsp. nutmeg
1 tsp. cinnamon
1 tsp. baking soda

Mix persimmons, sugar, eggs, butter and milk. Blend in flour and add spices and baking soda. Pour into a greased pan and bake for 45 minutes to an hour at 350 degrees. Remove from oven and serve warm.

Fish of Yesterday, Fish of Tomorrow

PERRY-WYNNS FISH COMPANY

Written by Jim Wilson

Once a fish of "primitive abundance," populations of river herring have crashed to mere shadows of what they were in the past.

Can the two species be restored, or will they remain simply reminders of what used to be?

"The recent trend of the North Carolina fisheries has not been altogether satisfactory, and the condition of the industry demands the thoughtful consideration of fishermen and lawmakers. ... Protective measures addressed to diminishing fishes must be radical if they are to accomplish any real benefit."

–Hugh M. Smith, "The Fish of North Carolina," 1907

In the coastal rivers of the East Coast, river herring have gone about their business of feeding, spawning and being eaten for untold centuries. Until the final decades of the 20th century, the alewife and the blueback herring, the two species collectively known as river herring, had done very well in their ecological roles.

The fish consumed zooplankton, reproduced by the millions each year, and at some stage of their lives were eaten by humans and other mammals, fish, birds, amphibians and reptiles. "Their abundance and cheapness make them of almost incalculable importance," Deputy U.S. Commissioner of Fisheries Hugh M. Smith wrote of alewives in "The Fish of North Carolina" in 1907.

MELISSA McGAW/NCWRC

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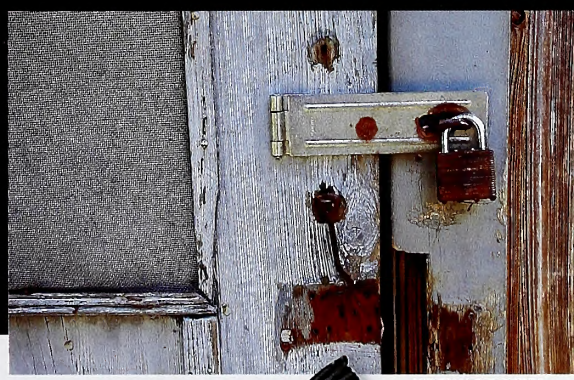
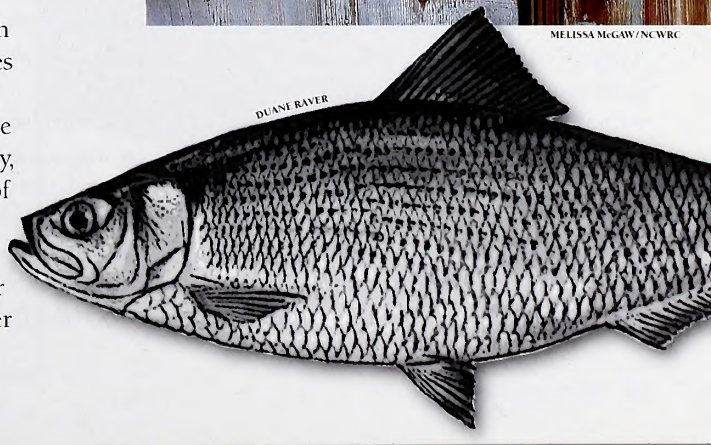


MELISSA McGAW/NCWRC

Fishermen once unloaded brimming boatloads of river herring (left) at such fish houses as Perry-Wynns in Colerain on the Chowan River. With river herring stock depleted and a fishing moratorium in place, venerable establishments such as the Cypress Grill in Jamesville face an uncertain future.

One hundred years later, river herring had fallen to such perilously low numbers that N.C. Division of Marine Fisheries director Louis Daniel, speaking to the Marine Fisheries Commission last February, stated that "Every spawning female river herring in the Chowan River is important." Later that day, the commission enacted the radical "protective measures" of which Smith wrote by ending the harvest of river herring.

What had brought a once-thriving fishery, in which North Carolina landings of 10 million pounds or more a year were commonplace, to the point where every fish in the river



NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES

JOEL C. HOLLAND

Scenes from Sutton Beach (top) in the late 1800s and Chowan Beach in 1941 show the fishing bounty provided by river herring.

had value? The basis for river herring's "almost incalculable importance" had swung 180 degrees, from abundance to paucity, throughout its range, with no definitive reasons for the paucity and no promise that the abundance would ever return.

Fish of History

Aside from inhabitants of the Coastal Plain, most people in North Carolina are unfamiliar with river herring. The two species' lack of publicity belies their importance. Blueback herring and alewives have played significant ecological, historical, cultural and economic roles, particularly in the northeastern counties, dating to the beginnings of our state and nation.

River herring have provided sustenance and income for inhabitants of what has historically been one of the state's poorer regions. The annual return of silvery masses of alewives (*Alosa pseudoharengus*) and bluebacks (*A. aestivalis*) was a fixed and anticipated natural occurrence that signaled the return of spring and sent an influx of protein up the rivers for the profusion of creatures that prey on them.

If the return of river herring was constant, so was some North Carolinians' steadfast dependence upon them. Because the little fish have oily flesh that can be preserved with salt—no ice required—river herring have been exploited since Colonial times. By 1765, Alexander Brownrigg had a sizeable herring and shad fishery operating at his plantation on the Chowan River, which, along with the Albemarle Sound, has traditionally been at the center of the fishery.

Historian Mark T. Taylor wrote in the *North Carolina Historical Review* in 1992 that by 1846, 15 major haul seines were operating in a 30-mile stretch of the sound. Pound nets began to replace the more labor-intensive haul seines in 1870, and by 1896 there were 1,125 of those nets in the sound and its tributaries.

The herring fishery grew to such an extent that by end of the 19th century, as Chowan County native W. Scott Boyce estimated in his 1917 Ph.D. dissertation entitled "Economic and Social History of Chowan County, North Carolina, 1880-1915," fishermen in the Chowan River and Albemarle Sound areas were landing 20 million pounds of river herring most years.

During the period of Boyce's study, herring could be purchased on the riverbanks at the height of the season for as little as $1.00 per thousand. Even at an average price of $2.50 per thousand, the fish, which could be eaten fresh, dried or pickled, were cheap fare. Meals of river herring, cornbread and black yaupon tea three times a day got many families through lean periods of the year, and much of the year for some citizens. Yaupon grew wild, and its leaves were dried for making tea. Corn was priced at 40 cents per bushel. "A dollar a month," Boyce wrote, "would procure for a person the most usual diet of much of the population."

Although long-term historical data for river herring landings in North Carolina are scant, the number of fish pulled from the waters of the area must have been enormous. In 1996, N.C. State University's Joe Hightower, along with co-authors Anton Wicker and Keith Endres, examined historical trends in river herring and American shad abundance in the Albemarle Sound in the *North American Journal of Fisheries Management*. Using data from a haul seine fishery that operated from 1845 to 1907 and the pound net fishery of 1977 to 1993, Hightower wrote that, based on modeling the years 1845 to 1993, the maximum sustainable yield for river herring was 12.6 million pounds, which is very close to the actual average harvest. That, Hightower

wrote, was "clearly a sustainable harvest under historical conditions of stock productivity." (Maximum sustainable yield is the maximum number of a fish population that can be removed each year under existing environmental conditions without damaging the stock's ability to grow back.)

In the late 19th century, few people considered that populations of bluebacks and alewives would not always be bountiful. Even such a prominent scientist as Englishman Thomas H. Huxley, president of the Royal Society and an early supporter of Charles Darwin's theory of evolution, thought that some fish species existed in such prodigious numbers that they could never be depleted.

"I believe, then, that the cod fishery, the herring fishery, the pilchard fishery, the mackerel fishery, and probably all the great sea fisheries, are inexhaustible; that is to say, that nothing we do seriously affects the number of the fish," Huxley said in 1883. "And any attempt to regulate these fisheries seems consequently, from the nature of the case, to be useless."

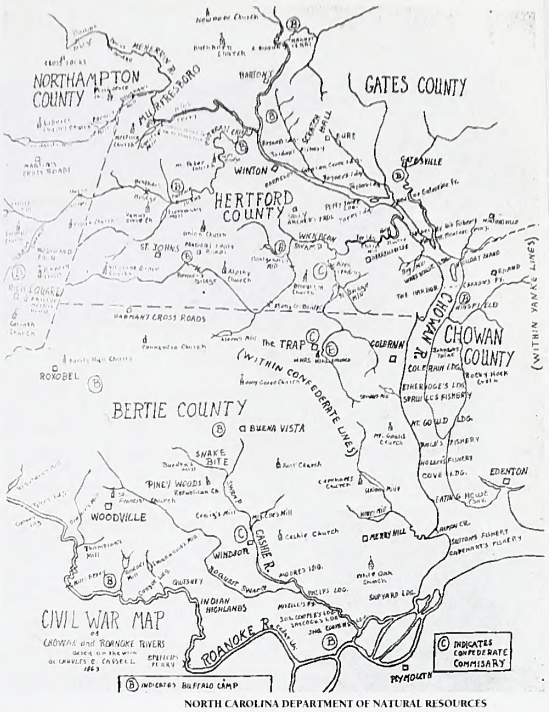
But even as far back as the 1870s, Spencer Baird, a zoologist who was then assistant secretary of the Smithsonian Institution and first commissioner of the new U.S. Commission of Fish and Fisheries, thought that river herring populations were declining. "I am inclined to think, for various reasons, that too little has been done in our waters toward the restoration to their primitive abundance of the Alewife," Baird wrote.

Baird went a step further and speculated that the decline of some important New England fisheries, which in part prompted the birth of the commission he directed, could be directly related to the decline of river herring, rather than Atlantic herring, as many thought at the time. "After a careful consideration of the subject, however, I am strongly inclined to believe that it is due to the diminution of the Alewives," Baird wrote. "[B]efore the construction of dams in the tidal rivers, the Alewife was found in incredible numbers along our coast. ... The coincidence, at least in the erection of the dams, and the enormous diminution in the number of the Alewives, and the decadence of the inshore cod fishery, is certainly very remarkable."

Trouble at Home

Fisheries problems were evident in North Carolina, too, though perhaps they were slower to develop in the less-industrialized northeastern Coastal Plain. (Even in the late 19th century, dams and polluted water hurt fish populations, and the northern states seemed to have more of both.) Of particular concern was a decline of American shad, which prompted the state to propagate and stock millions of those fish in the Albemarle Sound from 1877 to 1884. Fishing pressure in the area was substantial. So many pound nets filled Albemarle Sound that in 1905 the N.C. General Assembly passed the Vann Law, which mandated that fishermen must leave a channel in the sound for migrating fish. In 1911, a fisheries convention convened in New Bern to examine the state's fisheries and what one speaker called the "great depletion which has been on the increase among the commercial fisheries."

As the 20th century progressed, the annual catches of river herring began to decline, though not precipitously. Instead of the 20 million pounds annually that Boyce



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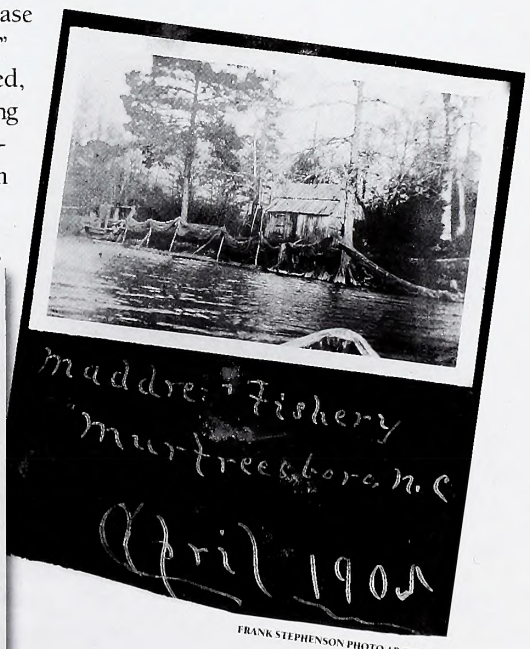
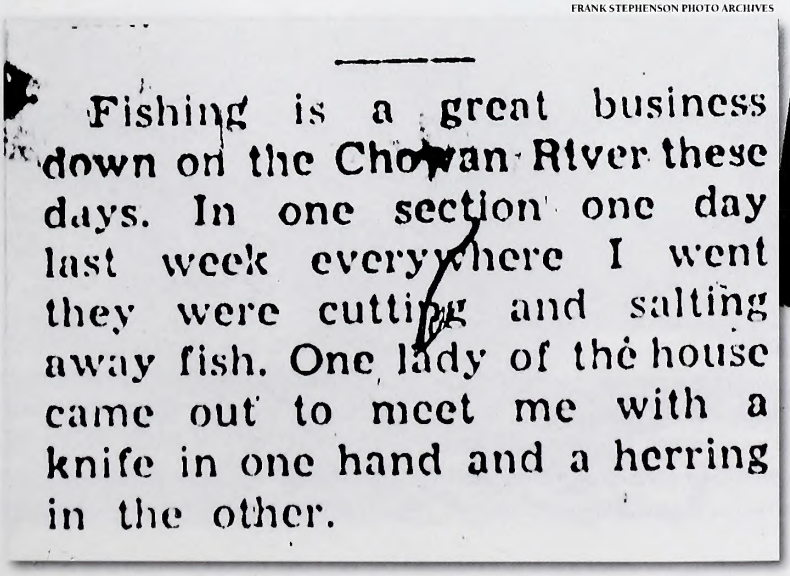
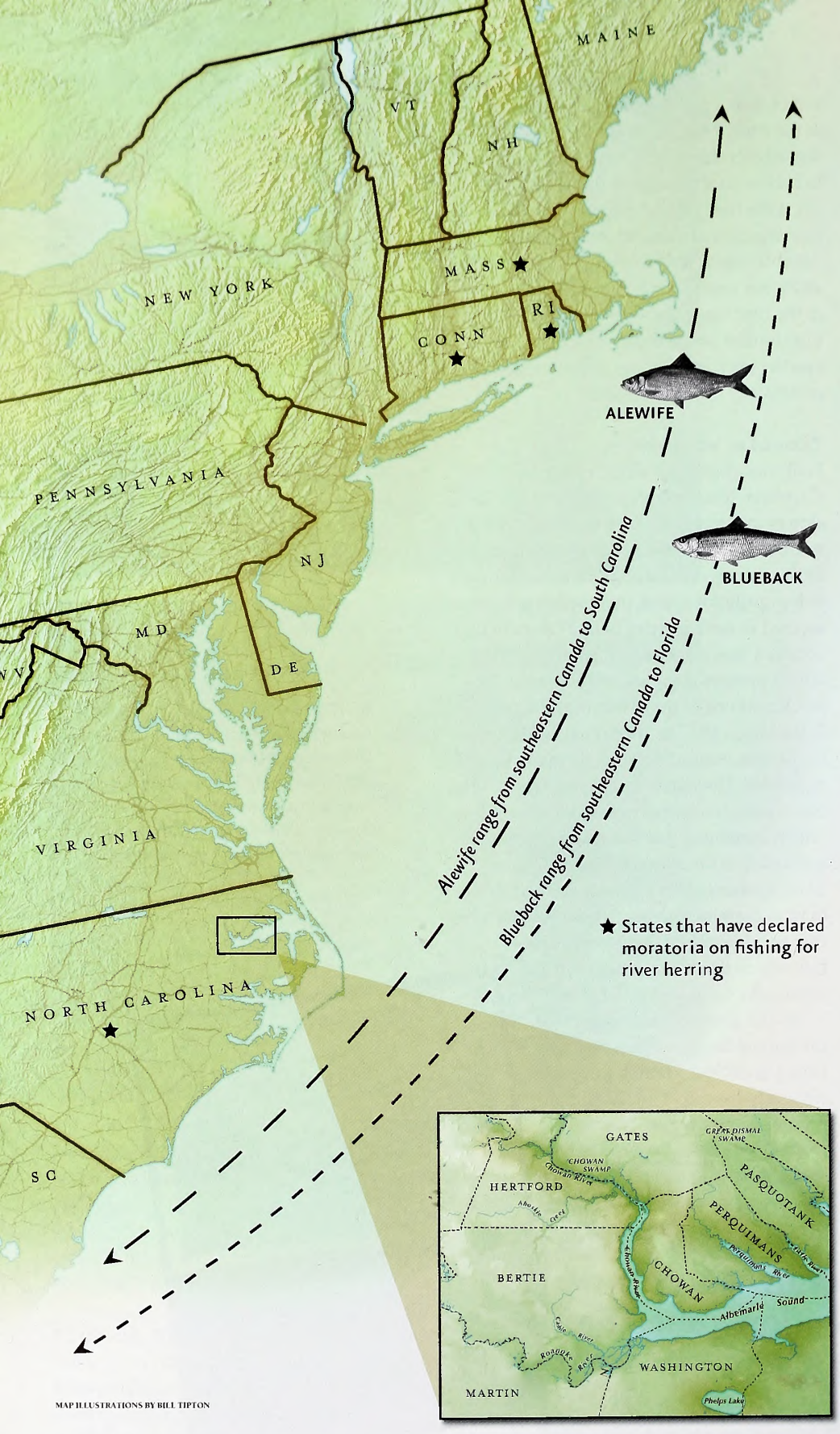
Herring long have been intertwined in northeastern North Carolina culture, as evidenced by this Confederate engineer's 1863 map which indicates fishery locations and a newspaper clipping from 1944. Maddrey's Fishery on the Meherrin River was just one of many operating in 1905.



FRANK STEPHENSON PHOTO ARCHIVES


Fishing is a great business down on the Chowan River these days. In one section one day last week everywhere I went they were cutting and salting away fish. One lady of the house came out to meet me with a knife in one hand and a herring in the other.

FRANK STEPHENSON PHOTO ARCHIVES



MAP ILLUSTRATIONS BY BILL TIPTON

Historically, alewives have ranged from southeastern Canada to South Carolina, with blueback herring extending to northern Florida. Since populations of the two fish have crashed, four states—North Carolina, Massachusetts, Connecticut and Rhode Island—have declared moratoria on fishing. North Carolina has requested that the Atlantic States Marine Fisheries issue a coastwide moratorium.

calculated, North Carolina fishermen by the 1950s were landing 11 million or 12 million pounds. In the early 1970s, the catch sank to about 8 million pounds. The last harvest reminiscent of the flush years of the fishery occurred in 1985, when fishermen landed 11.5 million pounds.

The following year, landings fell by 41 percent to 6.8 million pounds. The slide continued, and this time it was dramatic, as the catch dwindled to fewer than 1 million pounds by 1993. The N.C. Marine Fisheries Commission in 1995 implemented a season extending from Jan. 2 to April 14. The fishery operated under the season in 1995 and 1997. In 1996 and 1998, the rule was suspended and the season extended, with a 250,000-pound total allowable catch (TAC) and a 400,000-pound TAC, respectively. In 1999 the commission amended the rule and allowed a 450,000-pound TAC. From 2000 to 2005, the fishery operated on a 300,000-pound TAC. All TACs were in effect only for the Albemarle Sound Management Area; the remainder of the state operated under the Jan. 2–April 14 season. The TAC dropped to 100,000 pounds in 2006.

This robust fishery had declined to such an abysmal state that the 2006 landings were just over 100,000 pounds, with a value of only $83,182. The combined spawning stock biomass—the total weight of all the sexually mature fish in the population—for alewife and blueback herring in the Chowan River was less than 200,000 pounds. With other biological indicators for river herring also having bottomed out, DMF biologists called for a harvest moratorium. Recognizing that stocks had collapsed, the N.C. Wildlife Resources Commission already had enacted a moratorium on river herring harvest for inland waters.

Clearly, the situation with the stock was, as Marine Fisheries Commission chairman Mac Currin described it, "dire." What was unclear was why. Although DMF staff had determined in the latest N.C. River Herring Fishery Management Plan that the two species were overfished and that overfishing was continuing, other factors—loss of habitat, water quality, predation and oceanic bycatch—likely were affecting or exacerbating the decline.

Those environmental problems and the decline of river herring are not confined to North Carolina. Three other states—Massachusetts, Rhode Island and Connecticut—also have moratoria. DMF director

Daniel has asked the Atlantic States Marine Fisheries Commission (ASMFC), a compact of the 15 Atlantic coast states that coordinates management of those states' shared nearshore fisheries, to implement coastwide restrictions for bluebacks and alewives.

In 1965, the Atlantic states harvested 64.3 million pounds of river herring. Forty years later, those states combined for 724,714 pounds, a decline approaching 99 percent.

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The Big Black Box

It's impossible to talk about river herring without acknowledging that as commonplace as the fish have been, much about them is unknown. The two small fish species are similarly sized—reaching a maximum of approximately 12 to 13 inches—and look very much alike. They appear together in Atlantic waters from southeastern Canada to northern South Carolina. Bluebacks are found south to northern Florida.

Bluebacks and alewives are members of the Clupeidae family and are related to American shad, hickory shad, menhaden and sardines. Like shad—and striped bass—river herring are anadromous, meaning they spend most of their lives in salt water but return to fresh water in the spring to spawn. After spawning, the surviving adult fish head back to the Atlantic. The juveniles remain in the rivers and estuaries and then depart for the sea in late autumn or early winter, bound eventually for the continental shelf off New England.

It is when bluebacks and alewives disappear into the sea—what Wildlife Commission Coastal Regional Fishery Supervisor Pete Kornegay calls "the big black box of the Atlantic Ocean"—that our knowledge of them truly diminishes. "A lot of things can happen out there that we don't know about," Kornegay said.

Dick Brame, executive coordinator of the Coastal Conservation Association's Atlantic States Fisheries Committee, thinks there is indeed something happening to river herring while they are at sea. "I've always had a suspicion that they are bycatch in an ocean fishery we aren't aware of," Brame said. "One of the things we saw was when the ASMFC banned ocean netting of shad, lo and behold, those fish have begun to come back."

River herring bycatch in the oceanic Atlantic herring fishery is reported by National Marine Fisheries Service observers to be small, but the fishery for Atlantic herring, a different species of migratory, nonanadromous herring, is huge and growing. The 2005 landings of Atlantic herring totaled nearly 215 million pounds, about 87 percent of which came off Massachusetts and Maine. The days observers spend onboard fishing vessels are few but increasing. Even with an observer onboard, Brame said, it can be difficult for that person to differentiate alewives and bluebacks from Atlantic herring.

"When they empty a big purse seine, you're looking at millions of fish coming onto that ship," Brame said. "You can't see the trees for the forest."

Sara Winslow, Northern District manager for DMF, said that finding out what is

Fishermen haul seine at Capehart's Fishery in 1884 on the Chowan River in Bertie County.

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happening to river herring has become "one of the big issues that all the East Coast states have questions about. Something's happening; nobody really knows where it's happening, so we need to get a handle on where the removal is occurring. It's not occurring in North Carolina. It's on the East Coast, but where, I don't think anybody really knows."

During a 2005 meeting of the ASMFC's Shad and River Herring Management Board, Andy Kahnle of the New York State Department of Environmental Conservation said that on a trip to New York's Fulton Fish Market, he looked inside boxes labeled "Herring." "In those boxes were hickory shad, alewife and American shad, all about 10 to 12 inches long," Kahnle said. "So, there is a harvest that continues for all these species somewhere, and it's making it to the market."

Invasion of the Foreign Fleet

For a brief period beginning in the late 1960s, it was all too clear what was happening to river herring in the ocean. And what was taking place would have far-reaching effects.

In 1969 North Carolina fishermen's nets were flush with bluebacks and alewives. The total landings in our state numbered 19,761,700 pounds, more than in any other year since the National Marine Fisheries Service began keeping landings data in 1950. Following catches of 11.5 million pounds, 12.7 million pounds and 11.2 million pounds through 1972, the landings declined in 1973, and that trend continued.

From 1967 to 1972, a fleet of foreign fishing vessels recorded large catches of river herring in United States coastal waters, with the highest harvest—24 million pounds—occurring in 1969. Most of those river herring were immature fish less than 7 ½ inches in length. "This level of fishing pressure on subadult river herring was probably a major factor contributing to the declines in commercial landings of river herring along the Atlantic coast seen in the mid-1970s," DMF biologists concluded in the Fishery Management Plan.

The Magnuson-Stevens Act ended the directed harvest of river herring within the 200-mile Exclusive Economic Zone of the United States in 1977. Even with that fishery closed, river herring stock failed to show any significant improvement and remained on a downward track.

That's true enough, said Kornegay, but he doesn't believe the large landings at that time are the reason river herring stocks are depressed 35 years later. "Foreign fleets and Russian trawlers were really popular to blame during the Cold War," he said. "Some people still like to believe that was the cause. River herrings' longevity is such that they should have recovered several times since then."

CLUPEIDAE FAMILY

River herring and their cousins are found in many of the same waters off the Atlantic Coast.

BLUEBACK HERRING

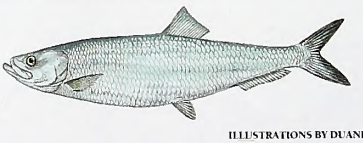
ALEWIFE

ATLANTIC MENHADEN

AMERICAN SHAD

HICKORY SHAD

ATLANTIC HERRING



ILLUSTRATIONS BY DUANE RAVER

For Kornegay, the major factor in the decline of river herring stocks is simple. "They were just totally overfished, decade after decade," Kornegay said. "Once you beat a population to a certain level, it doesn't take much of a perturbation to put them over the edge. The SSB [spawning stock biomass] is so low right now that any fishing pressure will be the final nail in the coffin."

The SSB is one of the statistics biologists look at to determine the health of a stock. According to the latest assessment, in 2003 the SSB for bluebacks was 89,678 pounds and for alewives 92,442 pounds. The figure for alewives has actually increased since 1995, when the SSB bottomed out at 10,862 pounds. Those figures are mere shadows of what they used to be. The blueback SSB averaged 8.3 million pounds between 1972 and 1986. For alewives the SSB from about the same period ranged from 1.1 million pounds to 3.1 million pounds.

At age 3, some river herring begin returning to their natal rivers—presumably—to spawn. But the bulk of the fish do not spawn until age 4, and some are 5 years old before spawning for the first time. Thus all the fish that comprise the 2007 year class will not spawn until 2012.

After their initial attempt, river herring return annually to spawn, and the repeat spawners are more productive than virgin spawners. Biologists can detect repeat spawners in fish samples by marks on their scales, caused probably by erosion on the edges of scales when the herring return to fresh water from the ocean and cease feeding until they have spawned out.

In 2006 DMF failed to find any blueback repeat spawners in its sample. That did not mean there were no repeat spawners in the entire population, but it was the first time DMF could not detect any repeat spawners among either males or females in its annual sampling, which dates back to 1972. Biologists in 2005 had found no male repeat spawners and 3.6 percent repeat females. For alewives in 2006, there also were no male repeat spawners, but 7 percent repeat females.

DMF's goal in its effort to restore river herring is to achieve a combined 10-percent repeat spawner rate among Chowan River blueback herring, which historically have tended to have higher populations than alewives here and are used as the indicator species in the Fishery Management Plan.

Another of the key indicators is the juvenile abundance index. As with the SSB and repeat spawner numbers, juvenile abundance is down. Abundance is measured in catch per unit of effort. The effort in this case is one haul of a 60-foot bag seine. Since the first sampling in 1972, the highest catch per unit

of effort for bluebacks was 362.9 juveniles per haul. In 2006, the juvenile abundance index was 0.5. DMF biologists would like to see the bluebacks reach a three-year moving average of 60 fish landed per unit of effort.

The fourth key indicator is recruitment, which is the number of new fish added to the stock each year. One of the problems with river herring today is historical recruitment overfishing. "That is a situation in which fishing mortality rates have significantly reduced annual recruitment," said Kent Nelson, Fisheries Program Manager for the Wildlife Commission. "It is characterized by a greatly reduced spawning stock, loss of older fish in the population and generally low recruitment year after year. Sustained recruitment overfishing can lead to stock collapse, especially if combined with other factors, such as poor environmental conditions."

DMF biologist John Carmichael noted in his 1996 assessment of Chowan River bluebacks that recruitment overfishing has been occurring for decades: "Strong year classes of the late 1960s sustained the stock through the mid-1970s, then poor 1975–1977 cohorts [year classes] contributed to the decline in the late 1970s. Exceptional recruitment of the 1978–1981 cohorts, averaging 30.5 million fish, allowed the stock to rebuild in the early 1980s, but another series of poor cohorts from 1983-1986, combined with sustained high fishing mortality, led to a decline in overall stock abundance."

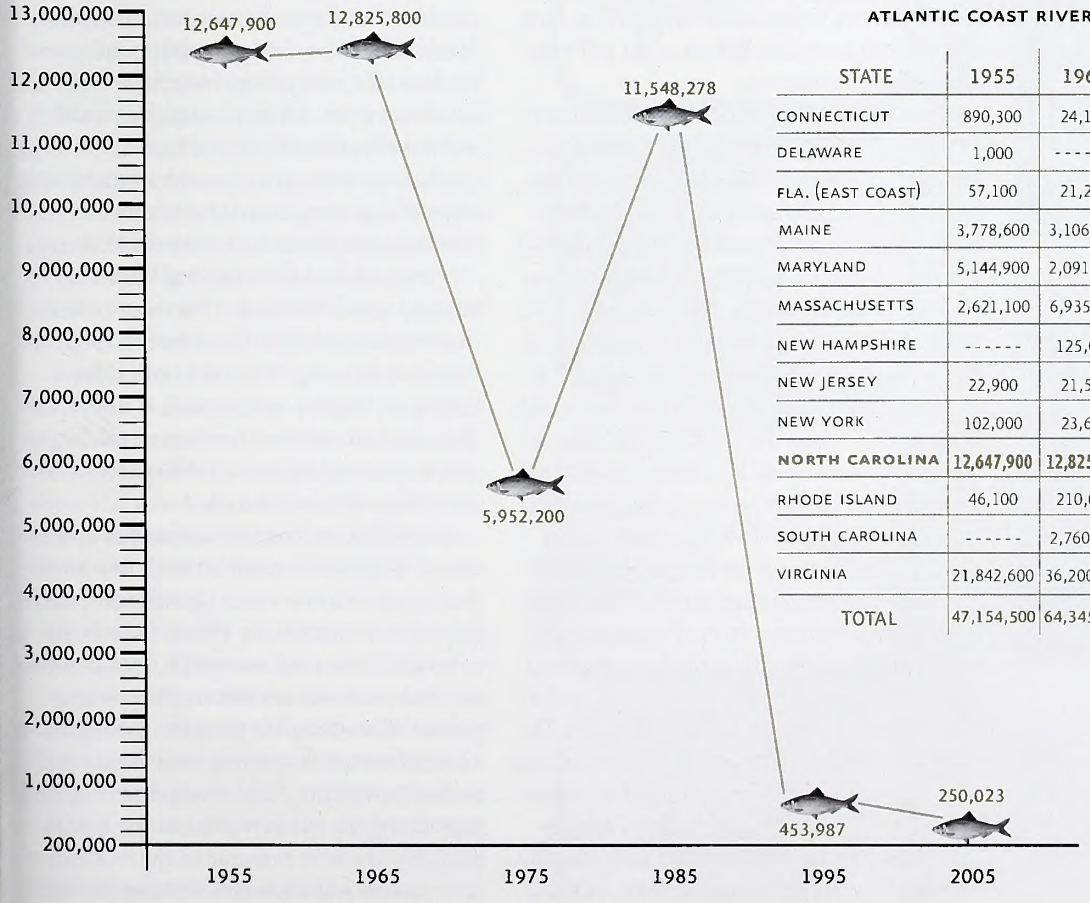
Some of the year classes at the time were truly large. There were 38.9 million recruits in the 1978 cohort, followed by 15.2 million, 38.1 million and 59.7 million. After that bang-up effort in 1981, recruitment spiraled downward. The following year produced only about 8 million. By 1997, the number fell below 1 million for the first time.

Winslow blames the recruitment failure on the low SSB. "I don't think the spawning stock is there to produce the recruitment," she said. "The population is at such low levels now, and you're dealing with only two or three year classes of fish that are contributing. Historically you had fish from 3 to 8 years old, and those repeat spawners had higher fecundity of eggs, more eggs. I think really that was where the recruitment was coming from. These fish that are spawning now are virgin fish; they're spawning for the first time, and then they're out of the system."

During the 1970s and for a few years in the 1980s, annual landings remained high, but the harvest was heavy with age-3 fish that had contributed only a few offspring to the population. Not until surveys began to show fewer and fewer juvenile fish did the problem become apparent. Fishermen had unknowingly harvested the future.

Dipnetters and Stripers

Among the restrictions DMF and the Wildlife Commission placed on the river herring fishery before the moratorium was a daily creel limit for recreational fishermen. Though the commercial harvest is well documented for several decades, the recreational component is all but unknown.



NORTH CAROLINA RIVER HERRING HARVEST (IN LBS.) 1955–2005

ATLANTIC COAST RIVER HERRING HARVEST (IN LBS.) 1955–2005

STATE	1955	1965	1975	1985	1995	2005
CONNECTICUT	890,300	24,100	25,200	38,900	14,044	------
DELAWARE	1,000	------	600	7,600	19,500	3,819
FLA. (EAST COAST)	57,100	21,200	1,800	------	------	------
MAINE	3,778,600	3,106,455	3,768,300	1,344,900	247,170	336,770
MARYLAND	5,144,900	2,091,800	718,400	183,900	34,582	38,368
MASSACHUSETTS	2,621,100	6,935,300	1,716,900	46,600	------	------
NEW HAMPSHIRE	------	125,000	------	61,300	------	------
NEW JERSEY	22,900	21,500	9,300	4,800	795	1,079
NEW YORK	102,000	23,600	15,300	150	------	------
NORTH CAROLINA	**12,647,900**	**12,825,800**	**5,952,200**	**11,548,278**	**453,987**	**250,023**
RHODE ISLAND	46,100	210,000	41,500	400	------	------
SOUTH CAROLINA	------	2,760,000	18,300	------	------	------
VIRGINIA	21,842,600	36,200,300	11,359,900	432,000	240,393	94,655
TOTAL	47,154,500	64,345,055	23,627,700	13,668,828	1,010,874	724,714

Ospreys are among the birds (top) that prey on river herring. One method of preserving the fish is to dip them in salt water and let them air dry (middle). Pound nets have long been the most popular method of fishing for herring.

There has never been much of a hook-and-line fishery for river herring, although some fish have been landed in recent years on Sabiki rigs—multiple-hook setups with artificial flies used for catching baitfish. Most of the recreational catch has been for personal consumption, using small nets such as bow, dip or skim nets, but drifted or set gill nets have been popular, too.

In the late 1960s, Wildlife Commission biologist Don Baker, the future chief of the Division of Inland Fisheries, surveyed the anadromous fish runs into inland waters and found that fishermen in those waters had harvested about 2.9 million pounds of river herring between April 1, 1967, and March 31, 1968. Baker determined that 76 percent of the herring catch was made with dip nets. Although the commercial harvest was much higher at the time, the recreational harvest over many years would have been another substantial factor in river herring fishing mortality.

Effective July 1, 2006, the commission placed a moratorium on the possession of river herring greater than 6 inches in length in all inland fishing waters of coastal rivers and their tributaries up to the first impoundment on the main course of the river, and all other inland waters east of Interstate 95. The 6-inch restriction allows anglers to use herring from stunted populations of inland reservoirs as bait. Most migrating herring are longer than 6 inches. In 2007, sensing an economic opportunity, some North Carolina seafood dealers imported fresh river herring from other states for sale as bait. In order to use those herring as bait, recreational fishermen were required to have in their possession a dated receipt, including the name of the retail store where they bought the fish. The receipt allowed enforcement officers to verify that the herring came from a legal source.

Bluebacks and alewives have long been the preferred natural bait for striped bass in eastern North Carolina and especially in the thriving Roanoke River fishery. The reason, of course, is that stripers prey on river herring, as do any number of other fish, including weakfish, bluefish, largemouth bass, white bass, white perch and yellow perch. (Throughout the Atlantic coastal area, birds such as cormorants, blue herons, ospreys and bald eagles also consume river herring.)

"To me, there's tremendous recreational and economic value to society in having abundant river herring to feed striped bass, or having juvenile river herring to feed a largemouth bass or crappie or warmouth," Kornegay said. "The adults and juveniles can really drive the prey base of all these game fish we consider important."

Some people believe that striped bass are one reason why river herring stocks have diminished. Stripers, however, have been blamed for other declining populations on both coasts, everything from blue crabs to steelhead trout, Chinook salmon, weakfish and American shad. Striped bass do eat those species and many more, but the argument that striped bass are primarily to blame for river herring declines doesn't work for Kornegay.

"Stripers and river herring have coexisted for years," he said. "There is no doubt that 1-year-old striped bass love to eat juvenile river herring. Whether or not that's having an impact on the stock is unknown. The crash in the river herring stocks began well before resurgence in striper stocks. The two events do not coincide."

Ironically, striped bass is another species whose population reached such low levels that many Atlantic states closed their coastal fisheries for much of the 1980s. The rebuilding of striped bass stock—from 4.6 million fish in 1982 to 65 million fish in 2005—has proven to be one of the great fish management success stories. According to ecologist and author Carl Safina, "The resurgence of striped bass along the eastern coast of the U.S. is probably the best example in the world of a species that was allowed to recoup through tough management and an intelligent rebuilding plan."

All of those striped bass have to eat, and during their spring and fall migrations, river herring make up a sizeable portion of Albemarle Sound striper diets—although menhaden appear to be the preferred prey. With river herring populations having declined, is it possible that striped bass and other predators could be a limiting factor?

"I think it will hinder recovery a lot," Winslow said. "I think the populations are low enough for river herring and large enough for striped bass that predation probably is having some type of impact now."

Moratoria worked for striped bass; it is uncertain whether a moratorium will ever restore river herring to their former abundance. More than two years ago, recently retired DMF director Preston Pate told the ASMFC Shad and River Herring Management Board: "Our concern at home is that we may have done too little too late, and the population may be at such a low level that it can't return, that there's just not enough mass there to turn the momentum of decline around."

Back in 1996, Carmichael warned that restoration could be problematic. "Even if exploitation is reduced significantly," he wrote, "population growth will be minimal until recruitment improves significantly."

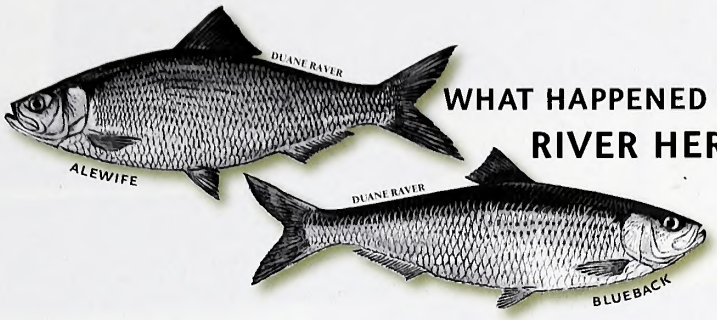
Brame is hopeful that the moratorium will provide relief. "We've found with other species that when we have put in measures to control harvest, populations have rebounded," he said. "We should have been controlling harvest for a long time. Herring are one of the greatest failures under the Fisheries Reform Act. The stock is beyond overfished; it's collapsed."

Under the 1997 N.C. Fisheries Reform Act, DMF is obligated to rebuild an overfished stock within 10 years. Even with a moratorium, DMF says the herring stock cannot be rebuilt in a decade. It could take 10 years plus one lifespan, which would amount to about 16 years. It could be more; it could be never.

Kornegay said he also thinks river herring can rebound. "They are so resilient that they can recover if we leave the existing spawning stock alone," he said. "I figure a minimum of five years before any recovery, and 10 to 15 years is more likely. We don't have any room for error, as decimated as the stock is now."

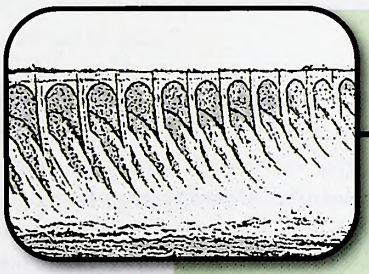
Impediments to Rebuilding

Aside from overfishing, which has been the primary factor in the decline of river herring,

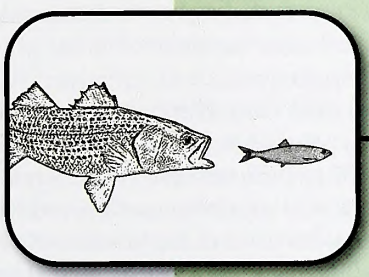


WHAT HAPPENED TO RIVER HERRING?

POSSIBLE REASONS FOR THEIR POPULATION PLUMMET

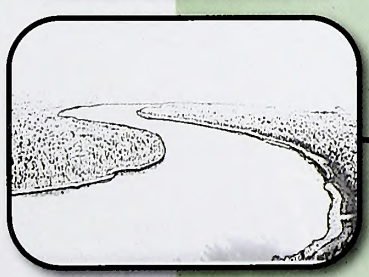


HABITAT LOSS
Habitat has been lost not only through dam building, which blocks river herring's upstream access, but also from stream channelization, road culverts and even beaver dams.

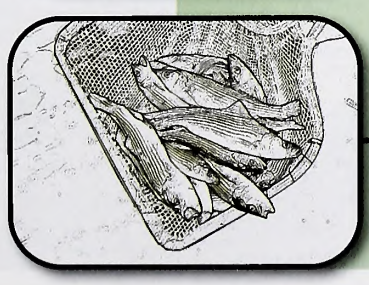


PREDATION
While humans have been a major factor in river herring mortality, many fish, including striped bass and largemouth bass, also eat them, as do birds, reptiles and mammals.

BYCATCH
Bycatch remains one of the unknowns in the decline of river herring. Some biologists suspect that unintended catch of alewives and bluebacks in oceanic fisheries could be substantial.



WATER QUALITY
Although blue-green algae blooms once were common in the Chowan River because of excessive nutrients, water quality has markedly improved and should not limit restoration of the species.



OVERFISHING
The major factor in the decline of river herring has been overfishing, particularly of younger fish that have had little or no opportunity to spawn.

ILLUSTRATIONS BY BILL TIPTON

Surveying spawning areas is a crucial need. One of the possible ways to rebuild river herring stock is with a stocking program,

either through capture and relocation of adults or through a larval stocking program.

Before that could happen, however, biologists would have to know the viable and nonviable spawning runs.

Division of Marine Fisheries biologists annually sample to determine the abundance of juvenile river herring.

loss of habitat and diminished water quality also have affected the fish. The problems with habitat are various. Riparian habitat is being lost to development; river herring no longer can access upstream portions of some tributaries because of road culverts and other obstructions, including beaver dams; and stream banks have been altered by navigation or drainage projects.

In his 1996 study, Hightower, after stating that the 11.9-million-pound average harvest from 1880 to 1970 was sustainable, wrote: "Thus, the only remaining question is whether habitat has been lost or degraded to such a degree that historical levels of harvest are no longer possible." In other words, a lack of habitat could be a limiting factor in rebuilding the stock.

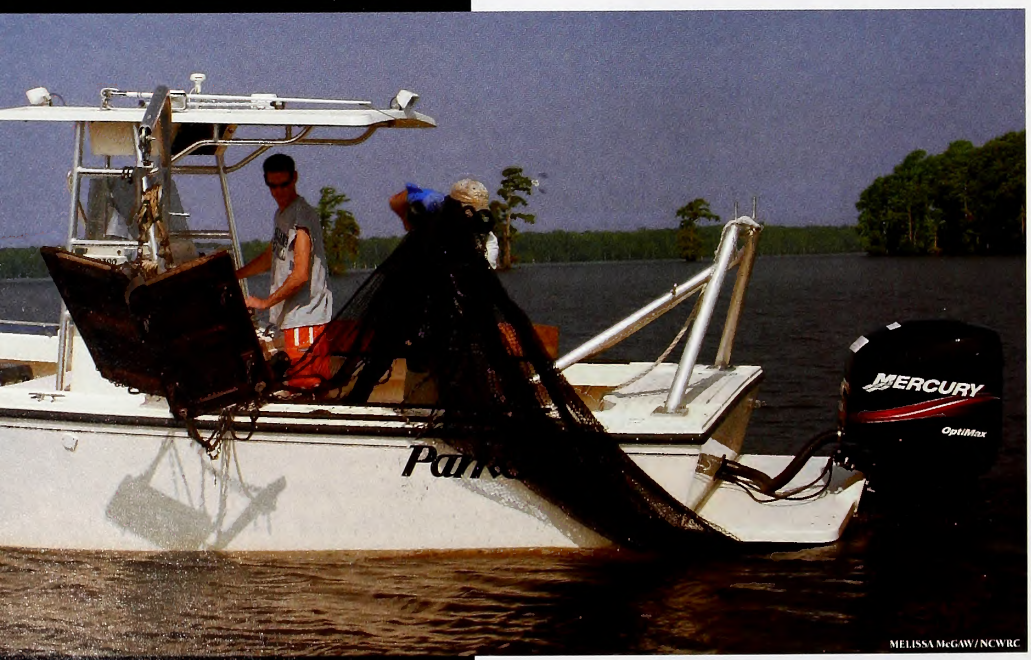
Despite a loss of some habitat, DMF biologists concluded in the Fishery Management Plan that there are not enough spawning river herring now to fully utilize the habitat that is available.

"To me there still is suitable habitat for the population to be brought back," Winslow said. "Through a combination of adult trap and transport, possible stocking, I think we can bring it back. Nobody is going to expect a 10-million-pound harvest anymore. The market's not there; the demand's not there. As far as it being a viable stock again, I think it can be done.

"It's not going to happen overnight, and unfortunately that's what most folks want, and that isn't going to happen. When you figure three to five years before anything spawned this year is going to be sexually mature, you're going to need two or three generations before you start seeing anything."

Christian Waters, Piedmont regional fishery supervisor for the Wildlife Commission, studied the effects of water quality on the hatching success of blueback herring eggs in the Chowan River. He agrees that river herring stock can be rebuilt. "It's pretty clear that overfishing is the cause of the decline," he said. "My graduate work with Joe Hightower indicated that water quality is not the limiting factor for restoration, and my observations would further suggest habitat loss isn't either. Those issues would limit the restoration to 19th-century levels, but I am confident a viable population could be supported under current conditions."

Water quality in the Albemarle Sound area, including the Chowan River, actually has improved over the past 20 years. But in 1979, the Chowan became the first body of water in the state to receive the designation of Nutrient Sensitive Waters because of excessive algae blooms. The Chowan drains



about 4,800 square miles of North Carolina and Virginia. Periodically throughout the 1970s, '80s and '90s, blue-green algae blooms plagued the river, lowering the dissolved oxygen content in the water. Fish kills were not uncommon, and the algae blooms also had detrimental effects on plankton. The water quality problems were simply one more impediment for river herring.

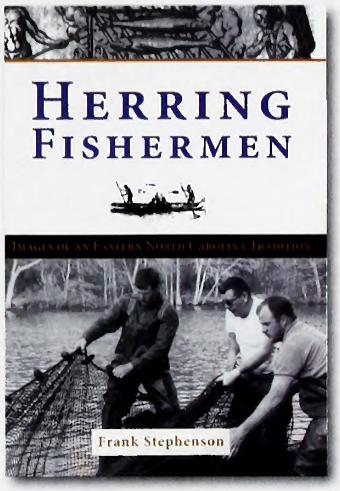
"East Carolina University did several projects and showed that at that time there was a decline in those zooplankton and phytoplankton," Winslow said. "Once they significantly reduced the nitrogen and phosphorous entering the river, mainly from point and nonpoint source discharges in the Chowan basin, the algae blooms started disappearing."

That CF Industries, a fertilizer manufacturer in Winton, shut down and Union Camp Bleached Paper Division in Virginia improved the quality of its effluent also benefited the river's water quality. CF Industries remains a Superfund site, however.

DMF has been unable to survey as much spawning habitat as it would like because of a lack of funding. In the early and mid-1970s, DMF's anadromous fish program operated largely with federal funds that were available based on the large harvests of foreign offshore fleets. As the landings declined, so did the amount of money the state received. Biologists have surveyed spawning habitat in two Albemarle Sound tributaries in the past 19 years—in 1993 and 2001. Other areas with historic river herring populations, such as the Tar-Pamlico, Neuse and Cape Fear, have not been surveyed in more than 25 years, due to loss of federal funds and personnel.

Surveying spawning areas is a crucial need. One of the possible ways to rebuild river herring stock is with a stocking program, either through capture and relocation of adults or through a larval stocking program. Before that could happen, however, biologists would have to know the viable and nonviable spawning runs.

Such a stocking program might never get under way because of the lack of hatchery facilities. "I do not see us as being able to convert any of our hatcheries to mass-produce river herring in enough numbers to make a significant difference," said Bob Curry, chief of the Wildlife Commission's Division of Inland Fisheries. "It would impact our other production. We can certainly experiment with methodologies on how to do it. We can experiment with ways that we may be able to move some fish and mark them to see if they are having an impact.



Frank Stephenson's "Herring Fishermen" is published by History Press.

"We would have to give up a lot to convert one of our facilities to forage fish, and that's basically what you would be doing. I don't see the ability to be able to buy hatcheries. If we can get a coastwide moratorium and get rid of the bycatch, I think the animals can recover on their own with time. And it does take time."

The Wildlife Commission has two warmwater hatcheries, McKinney Lake in Richmond County and Watha in Pender County.

Another stocking method some scientists are exploring is trap and transfer. Roger Rulifson, a fisheries biologist from East Carolina University, currently is working with commercial fishermen to test whether an adult river herring stocking program can be practical in North Carolina. He and Andrew Gross, an ECU Master of Science candidate, collected adults with commercial pound nets in the Scuppernong River, and then transported them to Lake Phelps where they were released. Work during the summer and fall will determine whether the adults spawned successfully in the lake, and also whether adults were able to migrate back to Albemarle Sound from the lake. "Adult alewife stocking is common practice in New England," Rulifson said, "but we'll have to wait until all data are collected on mortality related to capture, transport and release before we can determine success of the method."

As fisheries management moves into a new century, ecosystem management seems to be the path of the future. Instead of managing species by species, biologists would manage for the sustainability of the ecosystem.

There is a caveat, or perhaps more than one. "Ecosystem management sounds like a great idea until you try to implement it," Brame said. "Maybe we need to look first at the forage base, identify the species, look at them as a whole and figure out how many we need to support piscivorous species. We need to look at that forage base and what effects changes in it have on predators. We've ignored the bottom of the food web, just assumed it would be there. Now we're finding maybe it won't be."

In a 2005 meeting of the ASMFC Shad and River Herring Management Board, Eric Smith of the Connecticut Department of Environmental Protection noted that there are species, such as river herring and weakfish, that have declined for reasons that are not clear. Mortality in the ocean, he said, can be great.

"I think as we approach ecosystem management, we ought to start seriously looking at the fact that some of the valuable fisheries we have and the ones that are cherished, we may not have in the same way that we have had in the past, as some of the other fish we manage come back in greater abundance.

"It may just be a sad fact of life that you don't see river herring because you have a bigger fish out there that's eating a lot of them."

River herring, Kornegay said, could provide an opportunity to think anew about fisheries management. "I think it would be great if we had the stock for a commercial fishery. But you have to err on the side of conservation. If you have doubts, you err on the side of the fish; you don't gamble with the fish.

"River herring could be a poster child for how we should do things right, how to correct things that are wrong in fisheries management. Do we keep fishing them into extinction or do the right thing and give that stock the time it takes to recover? Then we can all begin to enjoy the benefits of having river herring around again."

Jim Wilson is the associate editor of Wildlife in North Carolina.

NATURE'S WAYS

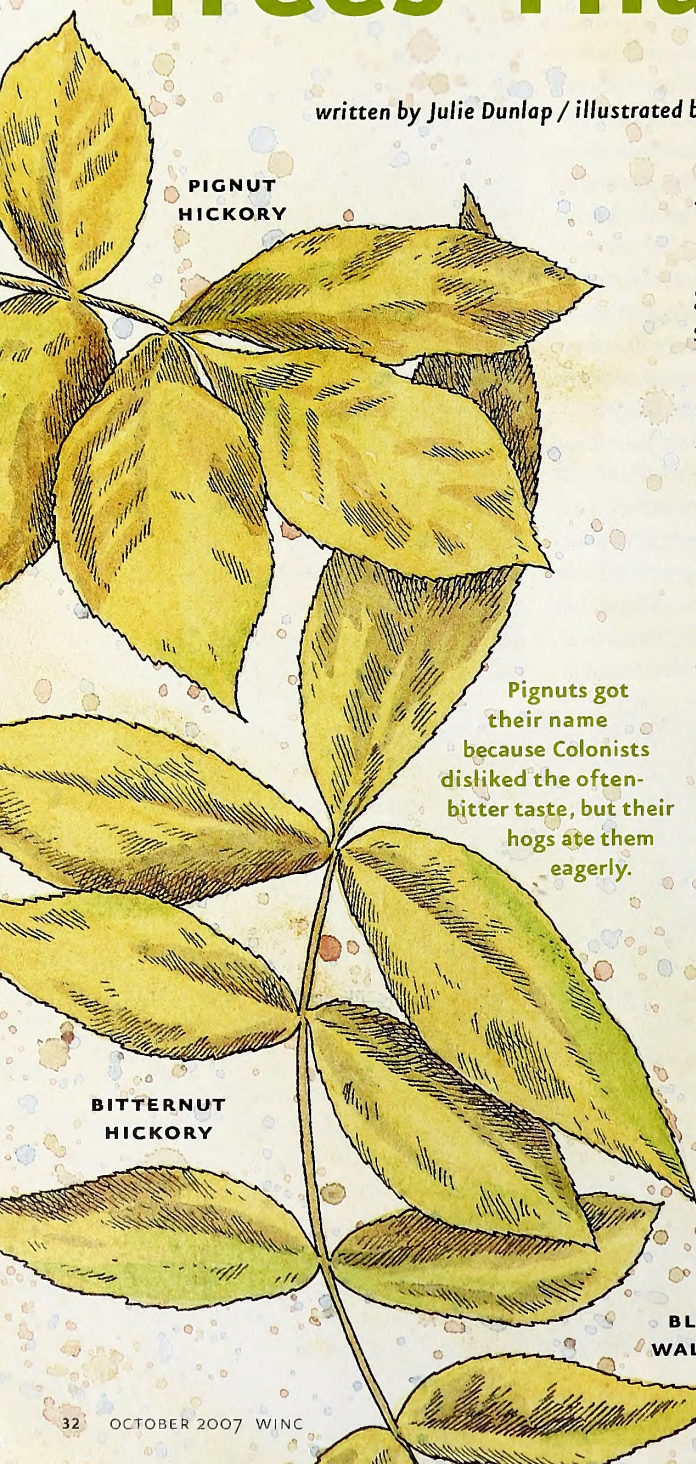
How Can River Herring Live in Both Fresh and Salt Water?

See Nature's Ways, page 39.

Want to spot walnut and hickory trees? Grab a guidebook and check the woods for the trees' distinctive bark and leaves. Or just follow a hungry squirrel.

Trees That Go Nuts

written by Julie Dunlap / illustrated by Consie Powell / nature activity by Anne M. Runyon



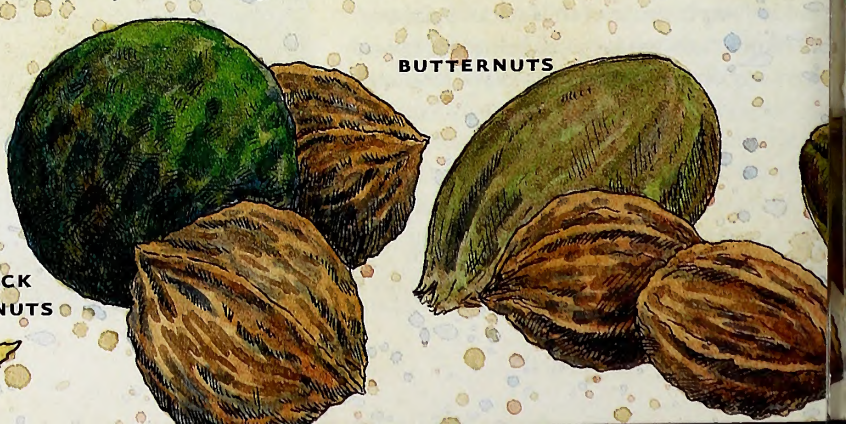
Pignuts got their name because Colonists disliked the often-bitter taste, but their hogs ate them eagerly.

Hickory and walnut trees belong to a plant family called Juglandaceae, from Latin words meaning "acorns of the god Jupiter." The family includes about 60 tree species that share many traits.

ONE NUTTY FAMILY

Walnuts and hickories are deciduous trees, shedding their leaves each year to prepare for winter. In spring, male and female flowers appear on each tree, and wind spreads their pollen through the woods. By fall, every species bears its own distinctive fruit, from the small, winged seeds of Asia's winged walnut to the hefty nuts of North America's shellbark hickory.

Walnuts and hickories live in many North Carolina habitats, on dry mountain ridges and moist river valleys, deep in old forests and on the edges of parks and fields. Our state is home to two kinds of walnut tree: black walnuts and butternuts, also called white walnuts. North Carolina's 11 native hickories include shagbark, pignut, mockernut and sand hickory. Our tallest hickories are pecan trees. Originating in the central and southern U.S. and Mexico, pecans have been planted in North Carolina for their tasty nuts for over 200 years. Thanks to forgetful squirrels, they now also grow in a few wild woods.

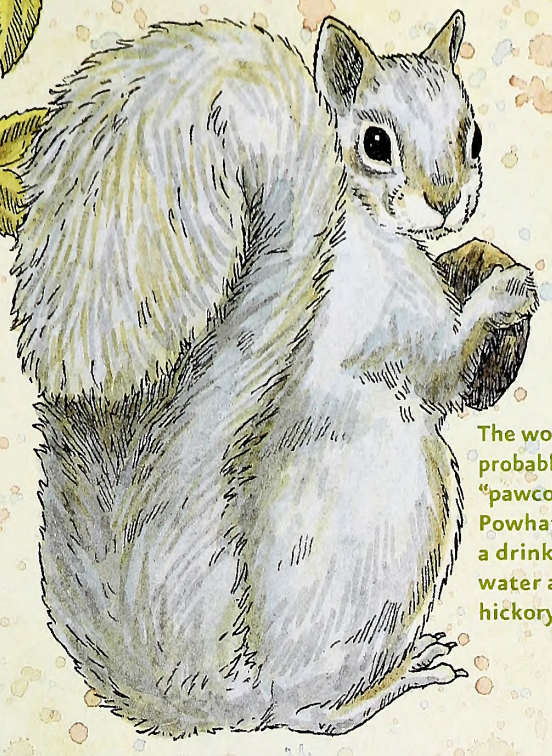


STONE FRUIT

When most people think of fruits, they imagine soft, juicy treats like berries and plums. But pecans and their relatives in the Juglandaceae family grow dry, woody fruits. A pecan's outer husk, or pericarp, is a thick, tough skin protecting the nut. The nut's hard outer shell, or endocarp, surrounds the softer kernel, or seed. It's usually easy to tell which kind of tree a nut comes from, based on details such as the shape and color of the husk, thickness of the shell and size of the kernel. Black walnuts, for example, bear large nuts with thick, ridged black shells inside hard, round, green husks. Pignut hickories grow thin, pear-shaped husks that split when ripe to release small, thick-shelled nuts.

Walnuts and hickory nuts also vary greatly in taste. Some kinds of nuts, such as bitternut hickory, have so much tannic acid that people and many wildlife avoid eating them. Other kinds of walnuts and hickory nuts are said to taste oily, rich, toasty or sweet. American Indians relied on many kinds of nuts for fall and winter food.

Squirrels, black bears, blue jays, woodpeckers and other wildlife also depend on nuts for winter survival. Hickory and walnut kernels are rich in fat, and wild creatures gobble as many as they can find each fall. Some years, wild nut trees produce a bumper crop of mast, the term scientists use for dry fruits of woody plants. Nut-eaters put on extra layers of fat, and the spring woods has bumper crops of baby squirrels and other creatures, too. But in other years, trees produce much less mast. Then wild animals must turn to less nutritious foods, such as twigs and bark, and may not live until spring.



The word "hickory" probably comes from "pawcohiccora," the Powhatan name of a drink made from water and crushed hickory nuts.

NUTTY NEIGHBORS

In a way, walnut and hickory trees need wildlife just as wildlife needs the trees. For a tree to reproduce, it must spread seeds away from the parent plant. Some trees, such as maples, have light seeds that can blow far on the wind. But hickory nuts and walnuts are too heavy. They spread by gravity, when they fall from the tree and roll off, or by wildlife that carry the seeds away. Gray squirrels are especially helpful, burying nuts in the ground to save for later. Any seeds that the squirrel forgets may sprout the next spring. So when squirrels store nuts for the winter, they're also possibly planting a future tree.

But squirrels that plant near walnut trees may be wasting their time. Trees in this family, especially black walnuts, have a chemical defense that prevents some plants from growing nearby and competing for water and nutrients. The chemical, juglone, washes from black walnut leaves and bark, and is secreted from the roots. Sensitive plants such as white pine, sassafras, rhododendrons and silver maple often yellow and wilt. Long after the tree dies, decaying roots release the toxin and kill more plants.

FUTURE FORESTS IN A NUTSHELL

A century ago, American chestnut trees grew in many of the same eastern forests where walnuts and hickories thrive today. A bark fungus introduced from Asia has nearly wiped out the species. Over the decades, our old chestnut-oak forests have turned into oak-hickory forests. Another introduced fungus now infects butternuts, spreading quickly and killing nearly every diseased tree. Scientists are searching for trees that resist the fungus, hoping to find a way to save the species. These days, scientists are helping squirrels and other wildlife keep butternuts and other walnuts as part of the forest plant community.

The fierce looking, but harmless, hickory horned devil caterpillar eats leaves of hickories and walnuts before metamorphosing into a royal walnut moth.

The peeling bark of the shagbark hickory gives the tree its common name.

Get Outside

Get squirrelly. Go nut collecting in the fall. Take a bucket big enough to store a variety of nuts, husk and all. Gather acorns from oak trees, pods from black locusts, walnuts, hickory nuts and any other hard mast you can find. How do other nuts and seeds differ from walnuts and hickory nuts? Imagine you are a squirrel. How could you hold each kind of nut and open it to reach the kernel? Which kinds of wildlife might prefer which kinds of seeds? Sketch the nuts you found to identify each species in a guidebook and take notes on how many you found of each kind. Check again next year. Which year had a better mast crop? Be careful to wash your hands after handling the nuts to remove dirt and bitter tannic acids.

Read and Find Out

- "Tell Me, Tree: All about Trees for Kids" by Gail Gibbons, Little, Brown, 2002.
- "My Favorite Tree: Terrific Trees of North America" by Diane Iverson, Dawn Publications, 1999.
- "Audubon Society Field Guilde to North American Trees: Eastern Region," National Audubon Society, Knopf, 1980.

In *Wildlife in North Carolina:*

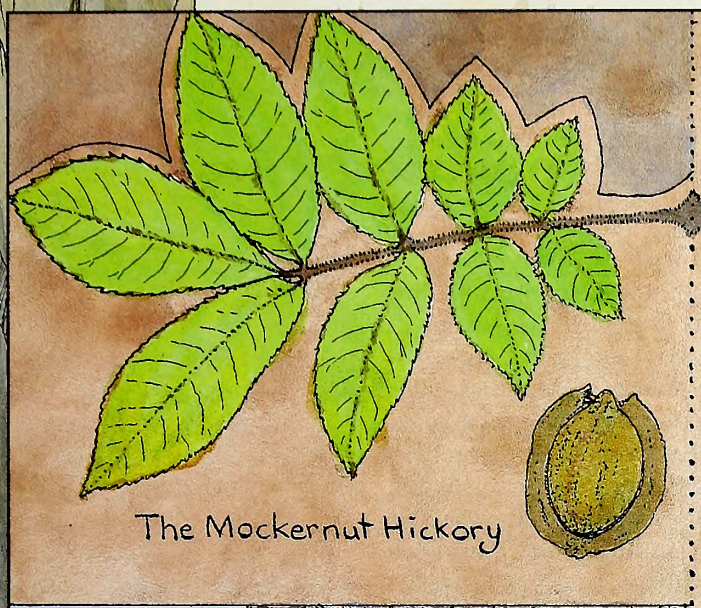
- "Hickory Milk and Yaupon Tea" by Burt Kornegay, October 1997.
- "A Gathering Tradition" by Jim Casada, October 2004.

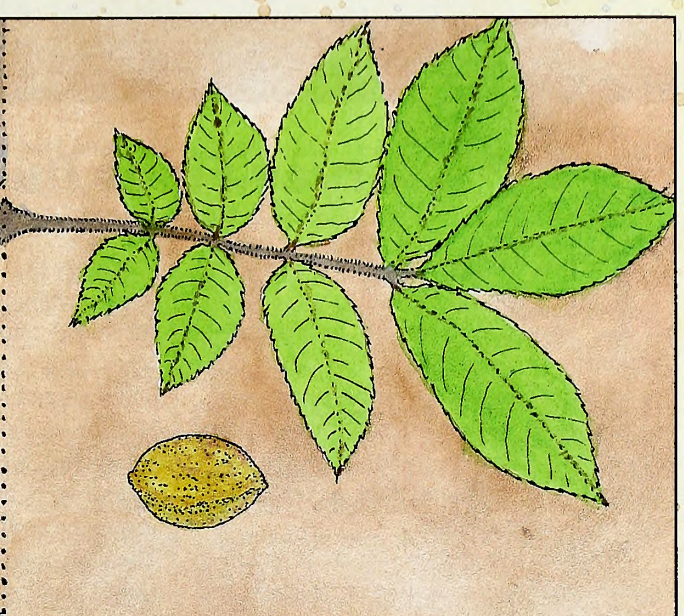
On the World Wide Web:

- National Arbor Day Foundation: www.arborday.org
- Plant Information Center, UNC-Chapel Hill: www.ibiblio.org

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Make A Mockernut Hickory Tree Bookmark





THE MOCKERNUT HICKORY
(*Carya tomentosa*)

The mockernut is the most common hickory in the Southeastern United States. It is found in well-drained upland forests. After growing a deep taproot, the mockernut spreads out a wide circle of lateral roots, helping to control soil erosion as it slowly grows up to 90 feet tall.

The mockernut bears its first fruit when it is 25 years old, and continues to produce nuts for about 200 years. Squirrels eat the nuts, even when still green, and many other wild animals feast on the sweet, ripe nuts in the fall.

1) Cut out the box and fold in half along the ... line.
2) Cut away the area above the hickory leaves at the top, following the black line.
3) Glue the two sides together to create your mockernut hickory bookmark.

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

Survey Finds Duck Population Increase

There was good news for ducks in the U.S. Fish and Wildlife Service's annual Waterfowl Breeding Population and Habitat Survey. The survey indicated a total duck population estimate of more than 41 million birds in the traditional survey area. This represents a 14 percent increase from 2006 and is 24 percent above the 1955-2006 average.

"We have five species that are at record or near-record highs, including canvasbacks, and there are good breeding conditions on the prairies," said H. Dale Hall, director of the U.S. Fish and Wildlife Service. "However, we remain concerned that pintails and scaup are well below long-term averages."

The Waterfowl Breeding Population and Habitat Survey, the largest and most comprehensive survey of its kind in the world, samples 1.3 million square miles across the north central United States, south central and northern Canada, and Alaska. The survey estimates the number of ducks in the continent's most important nesting grounds.

Annual survey results help guide the service in managing waterfowl conservation programs under authority of the 1918 Migratory Bird Treaty Act. The service works in partnership with state representatives from the four Flyway Councils—the Atlantic, Mississippi, Central and Pacific—to establish regulatory frameworks for waterfowl hunting season lengths, dates and bag limits.

Overall, habitat conditions for breeding waterfowl in 2007 were similar or slightly improved compared to conditions in 2006. The total pond estimate (prairie Canada and United States combined) was 7 million ponds, 15 percent greater than last year's estimate of 6.1 million ponds and 44 percent higher than the long-term average of 4.9 million ponds. For the third year in a row, habitat conditions were good or excellent in the northern grasslands and parklands of southern Saskatchewan and southern Manitoba.

Highlights from the survey in the north central United States, south central and northern Canada, and Alaska include:

- The estimated number of 8 million mallards is 10 percent greater than last year's estimate of 7.3 million birds and 7 percent above the long-term average.
- The estimated number of 6.7 million blue-winged teal is 14 percent greater than last year's estimate and 48 percent above the long-term average. This year is the third-highest estimate on record.
- The estimated number of 2.9 million green-winged teal is similar to last year's and 55 percent above the long-term average.
- The estimated number of 3.4 million gadwall is 19 percent greater than last year's and 96 percent above the long-term average, and the second-highest estimate on record for the traditional survey area.
- The estimated number of 1 million redheads is similar to last year's and 60 percent above the long-term average. This is a record high for the traditional survey area.
- The estimated number of 865,000 canvasbacks is similar to last year's and 53 percent above the long-term average. This is a record high for the traditional survey area.
- The estimated number of northern shovelers, at 4.6 million birds, is 24 percent above last year's and 106 percent above the long-term average. This is a record high for the traditional survey area.
- The estimated number of American wigeon, at 2.8 million birds, is 29 percent greater than last year and similar to the long-term average for this species.
- The estimated number of scaup (lesser and greater combined), at 3.5 million birds, is similar to last year's and 33 percent below the long-term average. This is the third-lowest scaup estimate on record for the traditional survey area.
- The abundance of northern pintails, at 3.3 million birds, is similar to last year's and 19 percent below the 1955–2005 average.

For the eastern survey area—which includes Maine, Maritime Canada, Newfoundland, Labrador, eastern and northern Ontario, and Quebec—estimates for all species were similar to last year's. Estimates for American black ducks and ring-necked ducks were significantly above their long-term (1990–2006) averages.

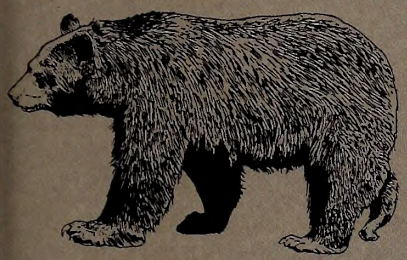
E. EUGENE HESTER

Bear DVD Available to Educators

For North Carolina educators who would like to teach their students about wildlife management, the N.C. Wildlife Resources Commission has produced a DVD of the popular documentary "The Bear Facts: The Story of a North Carolina Treasure."

The original 36-minute made-for-TV documentary about North Carolina's black bear population is now available in an Interactive Educator's Edition offering eight additional interactive functions for students to enjoy. The DVD is accompanied by a CD containing lesson plans, bear-related activities, maps and more educational materials suitable for grades K–12.

The project was the creation of Mark Jones, the black bear biologist for the Wildlife Commission. The original short



film has become a popular mainstay on many area public television stations. Now, educators across the Tar Heel State can request this unique learning tool at no cost through the N.C. Wild Store at www.ncwildlife.org. Over the course of several months, the commission has distributed more than 3,000 copies of the DVD.

In addition to public- and private-school teachers, the package is available to church groups, wildlife clubs, Boy and Girl Scout troops, museums and state parks, and other educational groups.

Jones designed the project so that teachers could expand beyond black bears, which range from North Carolina's western mountains to the low-lying coastal areas. "It teaches about broader issues like wildlife management and habitat," he noted. "It's not just bears." Jones said the free resource can be easily applied to subjects like geography, history and math, in addition to the sciences.

Bald Eagles Leave Endangered List

E. EUGENE HESTER

After nearly disappearing from most of the United States decades ago, the bald eagle is now flourishing across the nation and has been removed from the Endangered Species List.

"In 1963, the lower 48 states were home to barely 400 nesting pairs of bald eagles. Today, after decades of conservation effort, they are home to some 10,000 nesting pairs, a 25-fold increase in the last 40 years," said Secretary of the Interior Dirk Kempthorne in announcing the change in the species' status.

An estimated 60 to 80 pairs of bald eagles inhabit North Carolina.

Kempthorne emphasized the commitment of the Interior Department and the federal government to the eagle's continued success, noting that bald eagles will continue to be protected by both the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both federal laws prohibit "taking"—killing, selling or otherwise harming—eagles, their nests or their eggs.

In July, the U.S. Fish and Wildlife Service clarified its regulations implementing the Bald and Golden Eagle Protection Act and published a set of National Bald Eagle Management Guidelines. These measures are designed to give landowners and others clear guidance on how to ensure that actions they take on their property are consistent with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Upon delisting, the Fish and Wildlife will continue to work with state wildlife agencies to monitor eagles for at least five years, as required by the Endangered Species Act. If at any time it appears that the bald eagle again needs the act's protection, Fish and Wildlife can propose to list the species again.

The bald eagle first gained federal protection in 1940, under what later became the Bald and Golden Eagle Protection Act. The eagle was later given additional protection under the Migratory Bird Treaty Act. Soon after passage of the Eagle Act, populations stabilized or increased in most areas of the country. However, the eagle population fell into steep decline in later decades, due primarily to widespread use of the pesticide DDT after World War II. DDT accumulated in eagles and caused them to lay eggs with weakened shells, decimating the eagle population across the nation. Concerns about the bald eagle resulted in its protection in 1967 under the predecessor to the current Endangered Species Act.

The legal protections given the species by these statutes, along with a crucial decision by the Environmental Protection Agency to ban the general use of DDT in 1972, provided the springboard for Fish and Wildlife and its partners to accelerate recovery through captive breeding programs, reintroductions, law enforcement efforts, protection of habitat around nest sites, and land purchase and preservation activities.

ON PATROL

ILLUSTRATED BY JACKIE PITTMAN

District 8 officers experienced few problems during duck season. There were only three citations issued, and they were all for trespassing. One of the violators was approached by Sgt. Mitchell Kirkland as he was leaving a swamp in Rutherford County. When the hunter was asked for his written permission, he said he didn't have permission but had spoken with a person who hunted there, told him of his intentions, and learned that it was OK. Sgt. Kirkland found that very interesting considering that he, Kirkland, held the hunting lease on the piece of property in question. The subject was issued a citation and pleaded guilty in district court.

CALENDAR OF EVENTS

Thursday–Saturday, October 4–6

Compete in one of the state's oldest saltwater fishing tournaments, the 28th annual U.S. Open King Mackerel Tournament at Southport.
Visit www.usopenkmt.com.

Friday–Sunday, October 5–7

Check out the seafood and entertainment and learn about the cultural traditions that surround commercial fishing at the 21st Annual N.C. Seafood Festival in Morehead City.
Visit www.ncseafoodfestival.org.

Friday–Monday, October 5–November 26

Enjoy the wildlife photography of Juan Pons and Mike Dunn in their "Glimpses of Nature" show at the Nature Art Gallery in the N.C. Museum of Natural Sciences in Raleigh.
Visit www.naturalsciences.org.

Saturday–Sunday, October 6–7

Check out the decoys, paintings, photographs and more at the Virginia Beach Wildlife Festival in Virginia Beach, Va. Event features carving competition and an auction.
Visit www.awhm.org.

Friday–Sunday, October 12–21

Enjoy the N.C. Wildlife Resources Commission exhibits — including a shooting range, Sensory Safari Trailer and mobile aquarium — craft demonstrations, livestock exhibits, midway games and rides, concerts, food, and more at the N.C. State Fair in Raleigh.
Visit www.ncstatefair.org.

PICK UP A ROBUST REDHORSE BUTTON AT OUR EXHIBIT AT THE N.C. STATE FAIR.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

Redbreast Sunfish Print Benefits Aquatic Programs

The limited-edition "John E. Pechmann Fishing Education Center Redbreast Sunfish" print with stamp is now available to sportsmen interested in supporting fisheries education and conservation in North Carolina.

Proceeds from sales will go to aquatic programs conducted at the Fayetteville-based center and outreach projects coordinated across the state, including a mobile aquarium, kids' Fish-for-Fun events and the Tackle Loaner Program.

The center, named after the former chairman of the N.C. Wildlife Resources Commission who died unexpectedly in July 2006, provides anglers of all ages and abilities with opportunities to learn about fish, fishing, aquatic ecology and conservation.

The print is based on a painting by well-known artist Duane Raver and depicts one of Pechmann's favorite fish. An avid fisherman and longtime supporter of fisheries management, conservation and education, Pechmann could be found on many weekends casting for the colorful sunfish on the blackwater rivers of eastern North Carolina.

The print is available with or without a stamp. Prices are:

Signature proofs (730)	**$75 each**
Artist proofs (66)	**$125 each**
Remarques	**$15 each**
Stamps	**$10 each**
Stamps with artist signature	**$12 each**

To purchase a print and stamp or for additional information, call the commission toll free at (866) 945-3746, or visit the agency's N.C. Wild Store at www.ncwildlife.org.

IN SEASON

This month, these seasons are open in North Carolina:

Bear: See Regulations Digest for seasons and locations.

Bobcat: Oct. 15–Feb. 29, 2008.

Crow: Wednesday, Friday and Saturday of each week between June 1, and Feb. 29, 2008, plus Labor Day, Thanksgiving and Christmas.

Grouse: Oct. 15–Feb. 29, 2008.

Mourning Dove: Through Oct. 6.

Rail, Gallinule and Moorhen: Through Nov. 9.

Raccoon and Opossum: Oct. 15 (sunrise)–Feb. 29, 2008

Squirrel: Gray and red Oct. 15–Jan. 31, 2008. Fox Oct. 15–Dec. 31 in selected counties.

White-tailed Deer: Eastern: bow season through Oct. 5; muzzleloading season Oct. 6–12; gun season Oct. 13–Jan. 1, 2008. Central: bow season through Nov. 2. Northwestern: bow season through Nov. 9. **Western:** bow season through Oct. 6, and Oct. 15–Nov. 17; muzzleloading season Oct. 8–13.

Wild Boar: Oct. 15–Nov. 17 in Cherokee, Clay, Graham, Jackson, Macon and Swain counties. (In the other 94 counties, feral hogs are not considered to be wild boars, and the commission does not regulate them.)

There is no closed season or bag limit for groundhog, coyote, striped skunk and nutria, except that nutria may not be shot in Currituck County during open seasons for migratory waterfowl. There is an open season for taking beaver with firearms during any other open season for the taking of wild animals.

Check the *2007–2008 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps, or visit www.ncwildlife.org.

How Can River Herring Live In Both Fresh And Salt Water?

written by Clyde Sorenson
illustrated by Jim Brown

THE BIGGEST PROBLEM CONFRONTING ANADROMOUS fish is water balance. Most fish can't make the transition because their bodies are highly adapted to either fresh or salt water.

In fresh water, a fish's body is saltier than its surroundings, so its body constantly absorbs water through osmosis, and it tends to lose essential salts to its surroundings. To compensate, fish in fresh water drink almost no water and expel copious amounts of very dilute urine.

Fish also have special cells in their gills that pump salt. In saltwater fish, these are large cells that pump excess salt out; in fresh water, these cells pump what little salt is available in.

In salt water, the fish is less salty than its surroundings, so its body is constantly losing water through osmosis, while too much of those essential salts diffuse into its body. Saltwater fish drink large amounts of salt water and produce small quantities of very concentrated urine.

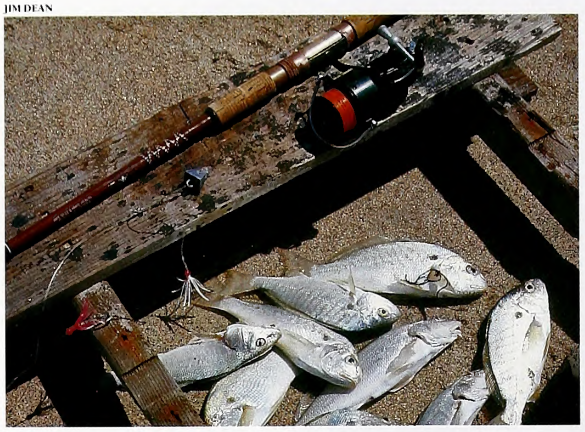
Anadromous fish make the transition from salt to fresh water gradually in the brackish estuary of their natal stream. If you take a herring from the ocean and drop it in a tank of freshwater, it will probably die rapidly from a sort of drowning.

Food for Thought

written by Jim Dean

By the time you read this, I will have confronted one of the most complex and contentious issues of our time. It has all the dramatic elements — what we eat, how we regard life, even how our animal heritage dictates our choices. Of course, you know it's also about fishing and hunting. What else is so important?

JIM DEAN



Anyway, my grandchildren Hannah and John Richardson are at the age where they want to go fishing. On recent summer vacations, they have reeled in spots, sea mullets and pompanos in the surf, and this past spring they learned to cast well enough to fish a farm pond. Hannah landed a 3-pound largemouth on a curly-tailed jig using ultralight spinning tackle. Hard to say whether she or the bass was more surprised.

But since all those fish were released, we never got around to discussing the thorny issue of taking a life in return for a meal.

"If grandpa chooses to collect some of his own food with rod or gun, he is merely fulfilling his ancient biological role — not to mention cutting out the middleman."

The easy solution would be to say nothing — which, alas, is the way we often handle that "birds and bees" business — but since today's social climate would almost surely prejudice Hannah's and John's beliefs, I feel an obligation to provide a little balance. Given their current interests in softball, sailing, Star Wars, music and reading Harry Potter, I don't think they're likely to take up bass fishing and duck hunting anytime soon. But, at the very least, I would hope they might understand that hunters and fishermen — and grandfathers, especially — have not abandoned the human race for the dark side.

It helps that they already know lots of hunters and fishermen in the family — all basically gentle and diverse souls with many hobbies and interests apart from casting and shooting. They know that we take our biological responsibilities at the top of the food chain seriously, and that we respect our environment and all life forms.

The tricky part will come on our beach vacation when we catch fish in the surf, and particularly when I suggest that we keep them for supper. If all goes well, we will ice down our catch and gather at the cleaning table for an interesting anatomy lesson (kids are curious). Getting them involved in the cooking should be easier, and it will introduce them to the pleasures of sharing simple domestic chores. Sitting down together with a platter of crusty golden-fried sea mullets, corn bread, sweet tea and homegrown tomatoes and sliced cucumbers in vinegar and sugar will be the reward. And I will point out that this tradition is not greatly different from when our distant relatives appreciatively gathered to gnaw a mastodon knuckle.

Even so, at some point, the morality of killing and eating the earth's fellow inhabitants is almost certain to arise. I won't be able to argue that we would starve if we didn't catch our own fish to eat — they know better — but I can point out that we buy our meat and vegetables packaged for consumption in grocery stores because we have arranged (for convenience) to have others do the killing and harvesting for us.

Once they perceive that these are our only two choices, the time may be ripe to suggest that killing and eating a fish (or a bobwhite quail, white-tailed deer or any other legally obtained species) is as natural for humans as it is for any other animal that must kill to eat and survive. Furthermore, nature supplies a surplus of prey for this purpose. If grandpa chooses to collect some of his own food with rod or gun, he is merely fulfilling his ancient biological role — not to mention cutting out the middleman.

They may not be quite ready to digest all this — sentimentality being the operative religion these days — but the taste of fried sea mullets may help (fish being brain food, after all).

Someday, if they make good grades in biology, they will learn that because we humans are omnivorous, we are biologically programmed to eat a wide variety of foods, including meat, and that doing so does not violate any natural law. They may even recognize that our definitions of sentimentality, morality and cruelty are contrived human concepts that do not exist in the natural world (ask any predator or prey). Once they've made that connection, they will surely realize that our currently disdainful attitudes about predators (including human predators) are dead wrong and hypocritical.

Hannah and John may decide they don't like fish — they may even become vegetarians or vegans — but it's less likely they will do so because they confused the issues.

Wanna hear something curious? Their grandpa seldom keeps a fish. It's not a question of morality or environmental sensitivity (so few fish are ever involved anyway).

He just hates picking out those little bones.

N.C. Wild Store

FREE Shipping!

HOLIDAY 2007

Steve "Santa Claus" Gattis is a Wildlife Resources Commission employee in the Division of Engineering Services.

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Jewelry
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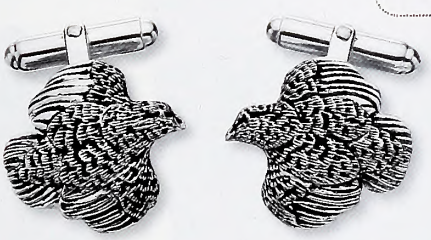

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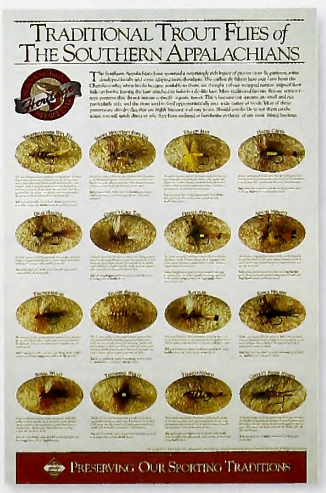

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NORTH CAROLINA Wildlife RESOURCES COMMISSION

Thank you!

www.ncwildlife.org

Wild Ones Caps

Wild Ones caps feature an intricately embroidered wildlife scene on the side and "NC Wildlife" tone-on-tone embroidery on the front. 100% brushed chino fabric with embossed leather back patch and adjustable Velcro back. **$20**

A. TROUT **Product code: DIR10111**
B. LAB **Product code: DIR10112**
C. BUCK **Product code: DIR10113**
D. BASS **Product code: DIR10115**
E. MALLARD **Product code: DIR10114**

NC Wildlife Caps

Native wildlife scenes embroidered on unstructured cotton. Precurved bill, brass eyelets, strap back with buckle. **$18**

F. KHAKI/CHARCOAL **Product code: 12206**
G. STONE **Product code: 12207**
H. BLACK **Product code: 12208**

Buck Hat

Our top seller. Classic Wildlife script under trophy buck. Adjustable strap with buckle. **$17**

I. CAMO/SUEDE **Product code: 12228**
J. CAMO **Product code: 12229**
K. ORANGE/BROWN **Product code: 12230**

Brook Trout Cap

Crushable. **$17**

Product code: DIR12204

Waterfowl Cap

New design. **$16.50**

Product code: DIR10116

Watch Caps

Keep one handy to wear alone or over a bill cap for extra warmth.

L. CAMO **$14** **Product code: DIR10119**
M. BLACK **$12.50** **Product code: DIR10118**

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NC Wildlife Hoodie

Black 50/50 cotton-polyester mid-weight fleece. Dyed-to-match drawstring, roomy pouch pocket, rib cuffs, bottom band. **$28**

Product code: 12254
Sizes: M, L, XL, XXL

Women's Work Shirt

Denim or stone color with exclusive "NC Wildlife" logo. Tough 100% cotton, adjustable cuffs, vents and straight hem for wear tucked in or out. **$32**

DENIM **Product code: 12255**
STONE **Product code: 12256**
Sizes: S, M, L, XL, XXL

Youth "Get Hooked" Sweatshirt

Outer Banks artist Kim Mosher's whimsical bass in 50/50 cotton-polyester fleece. **$13**

Product code: DIR10091
Sizes: S, M, L

Men's Work Shirt

Denim, khaki or black. Rugged 100% Peruvian pima cotton. Adjustable cuffs, locker loop, back center pleat, button-down collar.

DENIM **$40 Product code: 12257**
KHAKI **$45 Product code: 12258**
BLACK **$45 Product code: 12259**
Sizes: M, L, XL

Adult Longsleeve Tee

100% 5.6-oz. heavyweight preshrunk cotton. Silk-screened arm, rib collar, double-needle stitching throughout. **$14**

BLACK/WHITE LETTERS **Product code: 12262**
GRAY/NAVY LETTERS **Product code: 12263**
Sizes: M, L, XL, XXL

RED/WHITE LETTERS **Product code: DIR10120**
BLUE/WHITE LETTERS **Product code: DIR10121**

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Southern Trout Flies Poster

Sixteen wet and dry patterns for southern Appalachian trout. History and materials. 22x24 inches. **$7**

Product code: 12216

Classical Bass Lures Poster

Prewar, preplastic, antique bass lures from outdoor writer Jim Dean's private collection. 23x36 inches. **$9**

Product code: 12226

N.C. Decoys Poster

Traditional N.C. wood and canvas waterfowl decoys. 22x34 inches. **$7**

Product code: 12215

Sporting Dogs Poster

Pointers and retrievers, plus trailing and treeing breeds with breed characteristics and history. Each 22x34 inches. **$7**

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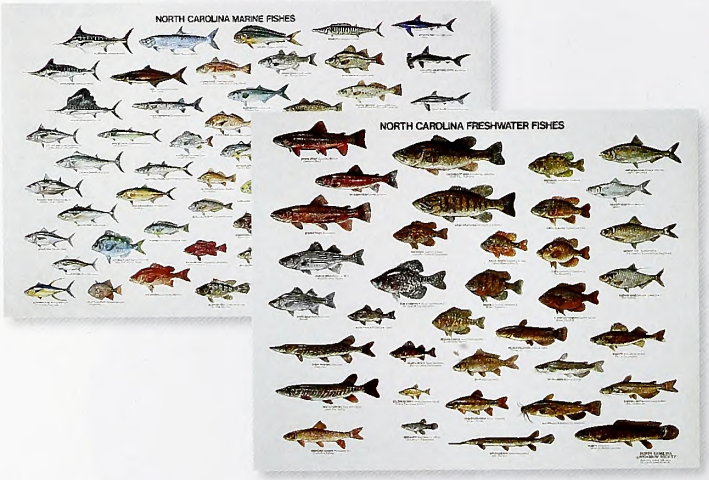

Fishes of N.C. Poster

Two posters: 36 freshwater species (28x22.5 inches) and 60 marine species (35x22.5 inches). **$13**

Product code: 12236

N.C. Mountain Fishes Set

Book and poster: habitat, range, diet, breeding and identification of 44 species.
Poster is 24x36 inches. **$11**

Product code: 12225

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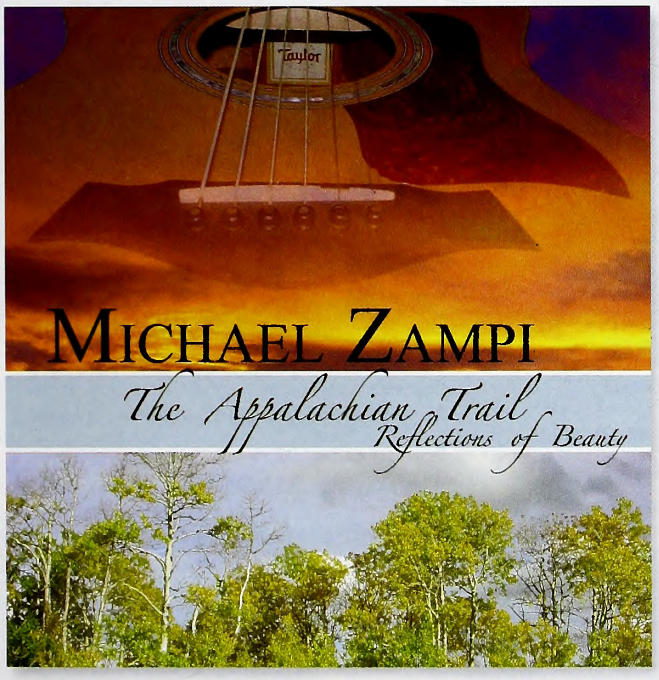
N.C. Salamanders Poster Set

Fifty-four native salamanders across three posters: habitat, life cycles. Each 24x36 inches. **$18**

Product code: 12221



Zampi's Applachian Trail CD

Environmental sounds to relax and elevate your spirit. **$13.99**

Product code: DIR10030

N.C. Butterflies Poster Set

Common (17) and rare (19) species, and where in the state to find them. Each 22x36 inches. **$12**

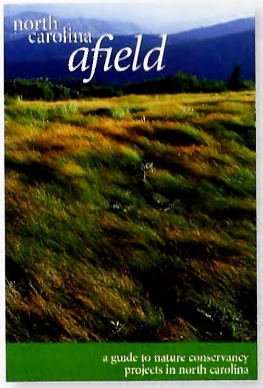
Product code: 12218

"The Bear Facts" Video

A Wildlife Commission production: history, biology, management, coexistence, hunting and future of the black bear in North Carolina.

VHS **$9** **Product code: DIR10017**

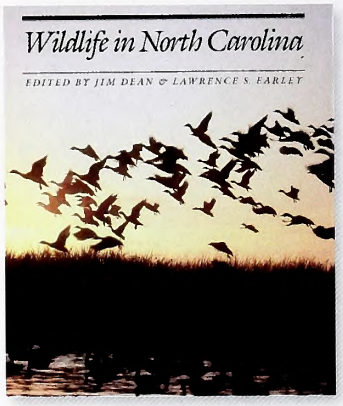
DVD **$12** **Product code: DIR10018**



North Carolina Afield

Guide to Nature Conservancy project areas. **$14.95**

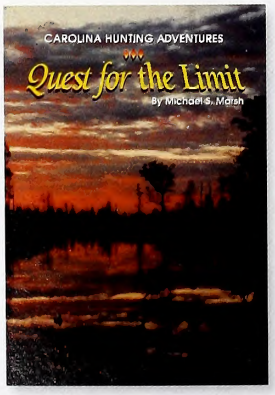
Product code: DIR10110



Wildlife In North Carolina Collection

Silver (50th) anniversary best of the magazine. Hardcover. **$10**

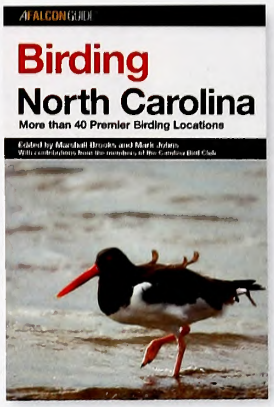
Product code: 12239



Quest for the Limit

Adventures in hunting. **$12.95**

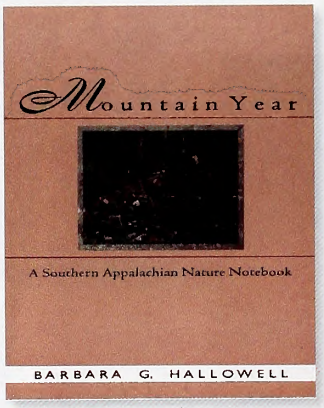
Product code: 12203



Birding North Carolina

Hot spots for birders. Proceeds benefit songbird projects. **$16.96**

Product code: DIR10033



Mountain Year

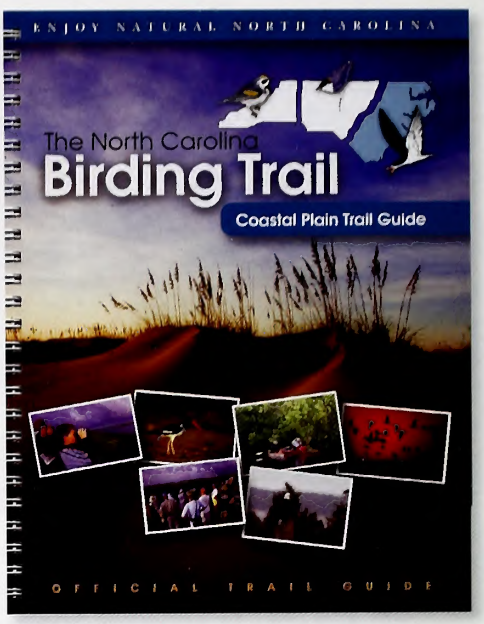
Four seasons in the Southern Appalachians. **$18.95**

Product code: DIR10147

Blue Crabs

How to catch 'em, cook 'em, eat 'em. **$15.95**

Product code: 12193



N.C. Birding Trail

Guide to the Coastal Plain section of the new N.C. Birding Trail. **$10**

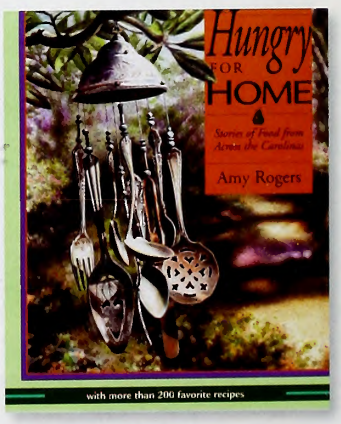
Product code: DIR10144

Nature's Ways

More than 200 essays in 6 volumes. **$15**

Product code: 12235

IN LIBRARY CASE **$15.95** **Product code: 12134**



Hungry for Home

Authentic Carolinas cuisine cookbook. **$19.95**

Product code: DIR10146

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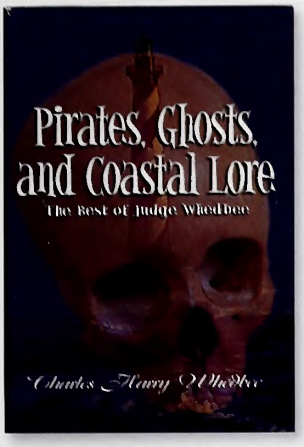
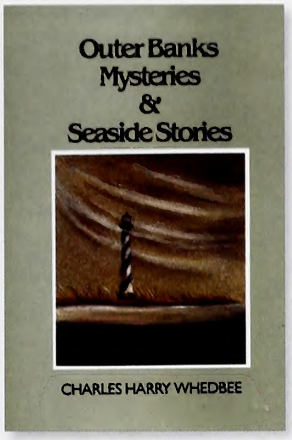


Pirates, Ghosts, and Coastal Lore

Outer Banks: the dark side. **$13.95**

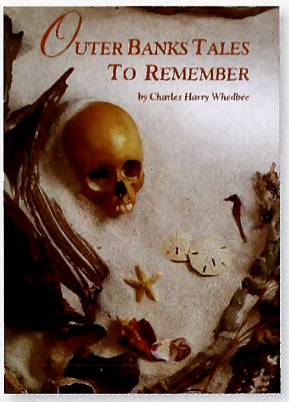
Product code: 12200



Outer Banks Mysteries

Read at your own risk! **$12.95**

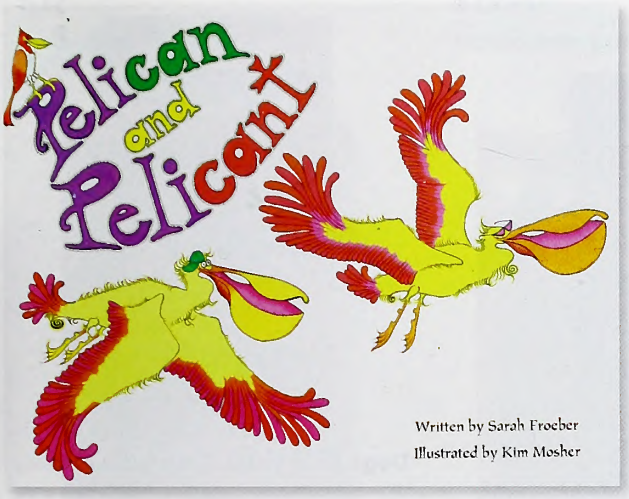
Product code: 12199



Tales to Remember

Outer Banks legends and lore. **$13.95**

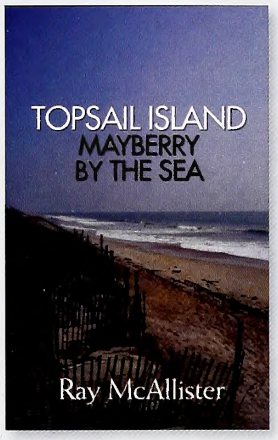
Product code: DIR10149



Pelican and Pelicant

Illustrated children's book. **$20**

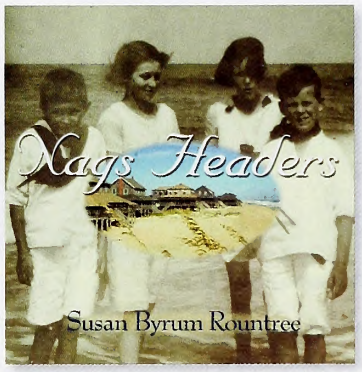
Product code: 12211



Topsail Island

From pirates to secret rocket silos. **$12.95**

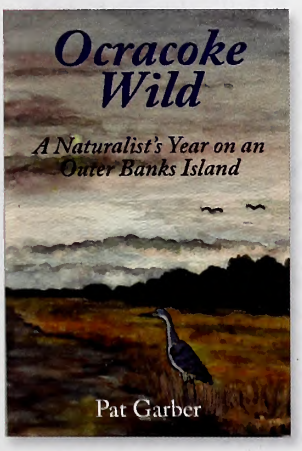
Product code: DIR10058



Nags Headers

Way back when on the Outer Banks. **$16.95**

Product code: DIR10148



Ocracoke Wild

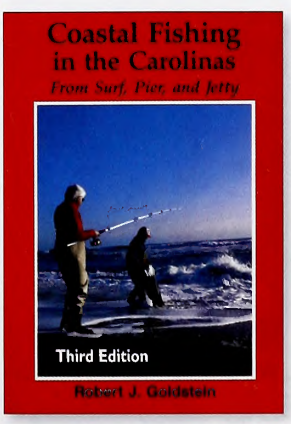
Ocracoke off the beaten boardwalk. **$14.95**

Product code: DIR10068

Hope for a Good Season

The traditional fishing culture of Harkers Island. **$15.95**

Product code: DIR10109



Coastal Fishing in the Carolinas

Downeast how-to and local lore. **$15.95**

Product code: 12201

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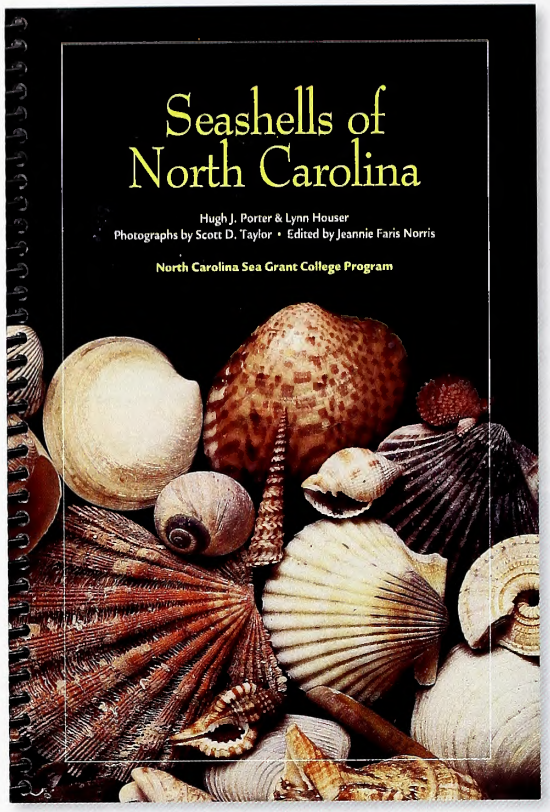
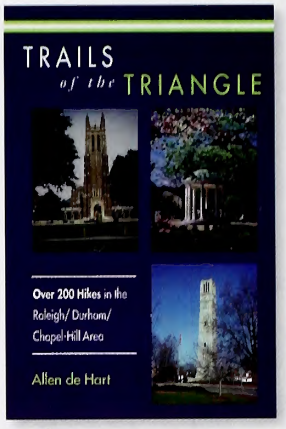


Seashells of N.C.

A walk on the beach is never the same once you know the shells. **$12**

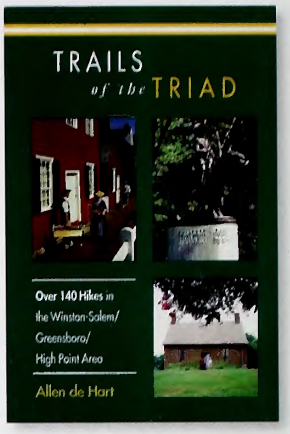
Product code: 12204



Trails of the Triangle

Here are 200 trails within a 60-mile radius. **$11.95**

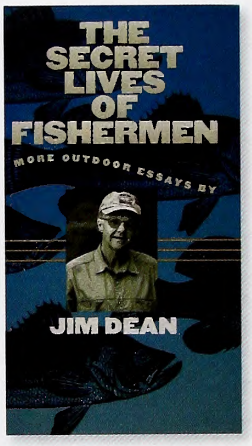
Product code: 12205



Trails of the Triad

From city parks to national forests. 140 walks. **$11.95**

Product code: DIR10070



The Secret Lives of Fisherman

Jim Dean's second book of essays. **$27**

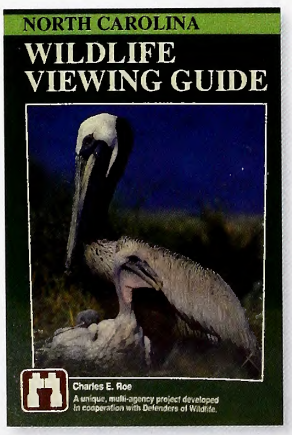
Product code: 12241

Dogs That Point, Fish That Bite

Funny and touching, 50 of Dean's best.

HARDCOVER **$22** **Product code: 12240**

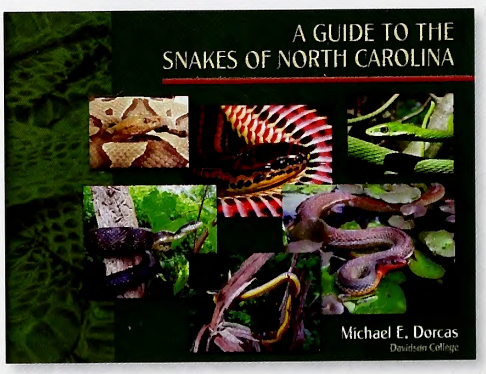
PAPER **$14** **Product code: 12242**



N.C. Wildlife Viewing Guide

What to see, and where. **$8**

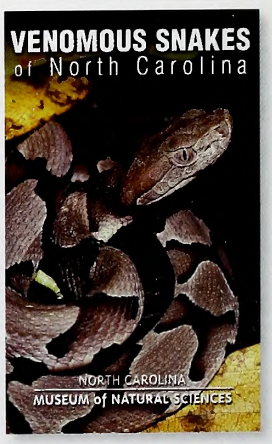
Product code: 12227



A Guide to the Snakes of North Carolina

All 37 venomous and non-venomous, with range maps. **$8.95**

Product code: DIR10032



N.C. Venomous Snakes

Just the venomous ones. **$4**

Product code: DIR12238

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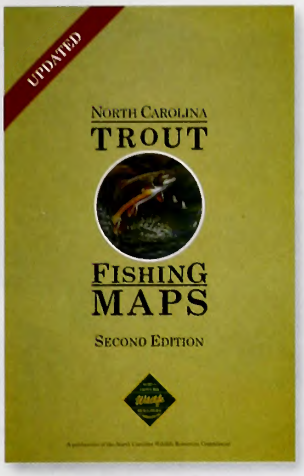
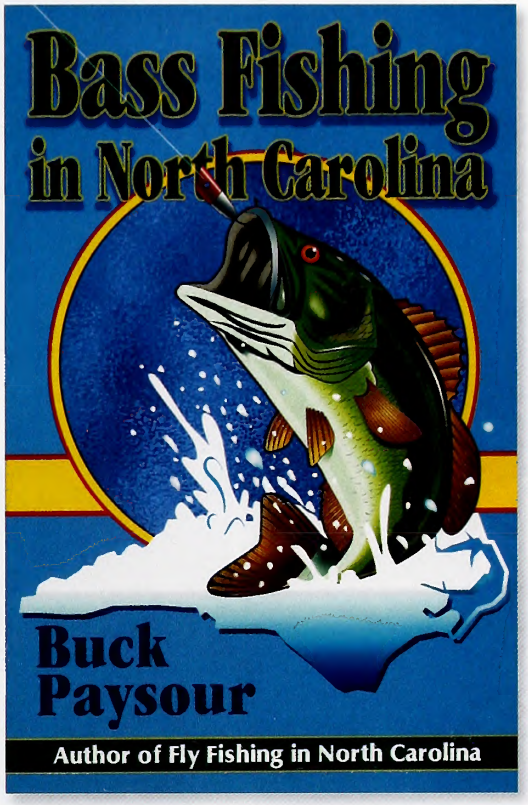


Trout Map Book

2007–08 edition with updated maps.
$12
Product code: DIR10022

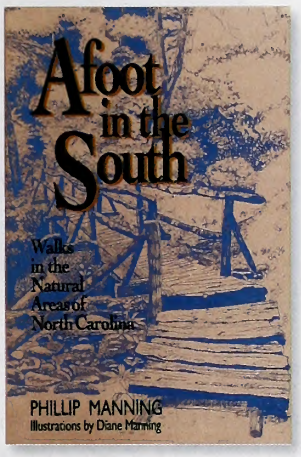
Coastal Nature

Animals, shells, physical features.
$15.95
Product code: 12194



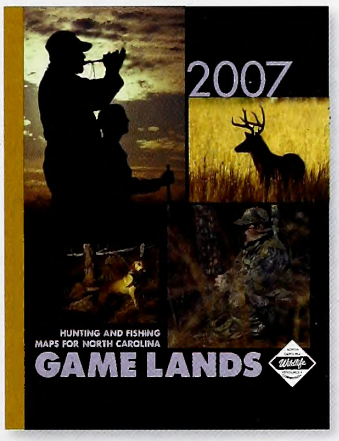
Bass Fishing in N.C.

Largemouths or smallies — nobody knew them better than Buck Paysour, who fished N.C. for over half a century. A guidebook to bass hideouts and fishing techniques. **$14.95**
Product Code: DIR10071



Afoot in the South

N.C. natural areas from mountains to shore. **$12.95**
Product code: DIR10145

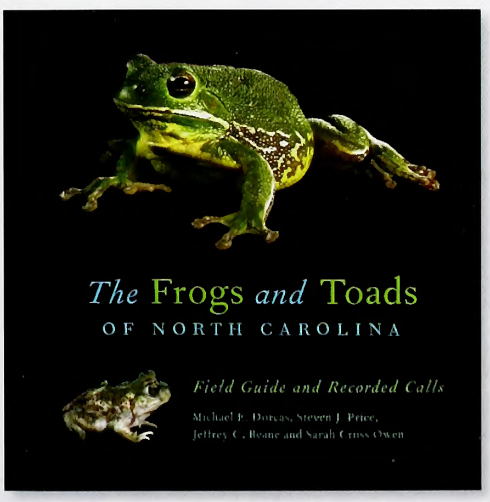


Game Lands Maps

2007–08 edition, 1 million N.C. acres.
$10
Product code: DIR10143

The Frogs and Toads of North Carolina: Field Guide and Recorded Calls

This long-awaited field identification guide with CD features descriptions and calls of North Carolina's 30 frog and toad species. The 80-page booklet is packed with more than 120 full-color photographs that beautifully illustrate the stunning array of colors, shapes and sizes of North Carolina's diverse and abundant frog and toad populations. **$15**
Product code: DIR10142



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Mini Umbrella

Collapses to fit a purse or daypack. **$12**

Product code: DIR10078

Pathfinder Set

Mini-flashlight, knife and compass. **$30**

Product code: DIR10034

Tote Bag

Roomy tote for beach or market. **$14**

Product code: DIR10072

Camo Bag

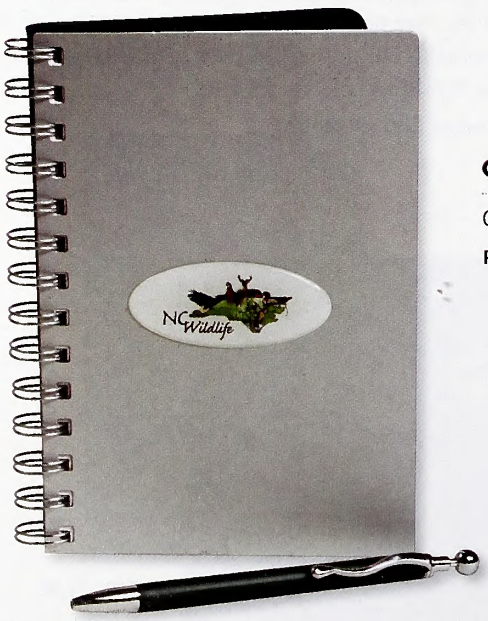
Heavy-duty bag for carrying everything from ammunition to clothing. Separate hardwall compartment for shoes or boots. **$49.95**

Product code: DIR10106

Camo Umbrella

Golf size. **$36.95**

Product code: DIR10105



Journal

Aluminum cover, with distinctive pen.
$18

Product code: DIR10028

Pocket Tool

Essential tools with belt sheath. **$26.00**

Product code: DIR10029

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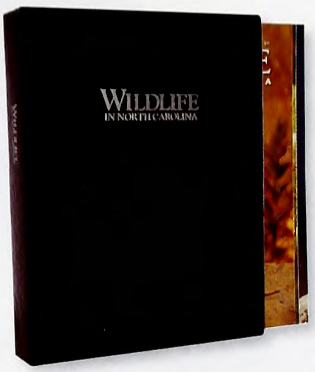
Magazine Binder

Binds 12 issues of *Wildlife in North Carolina*. **$15**

Product code: DIR10031



Library Case

Holds 12 issues of *Wildlife in North Carolina*. **$11.50**

Product code: DIR10136

Zippo Lighter

For campfire or hearth. **$32**

Product code: DIR10104

Travel Mug

Insulated, closable top. **$10**

Product code: 12209

Camo Coffee Set

Keeps beverages hot in shooting blind or stand.

TUMBLER **$14** **Product code: DIR10097**

THERMOS **$29** **Product code: DIR10096**

Book Light

Folds for compact storage. **$7**

Product code: DIR10095

Travel Dog Bowl

Folds down for storage. **$10**

Product code: DIR10099

Pet First Aid Kit

Field first aid kit. **$10**

Product code: DIR10087

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Heated Footbed

Warming boot insert. **$15.95**

Product code: DIR10107

Raver Note Cards

Duane Raver art. **$12**

Product code: DIR10165

Pop-top Mitts

Glove and mitten in one.

CAMO **$20.99** **Product code: DIR10127**

BLACK **$20.99** **Product code: DIR10126**

Sizes: S, M, L, XL

Helsabeck Note Cards

From the Mike Helsabeck© Collection, these 5x5 inch note cards feature Bodie Lighthouse or Whalehead Club. 12 blank notecards and 12 envelopes. **$10**

SNOWS AT BODIE

Product code: DIR10140

PINTAILS AT WHALEHEAD

Product code: DIR10141

Essick Note Cards

Hummingbird art by Demsey Essick. **$7**

Product code: DIR10165

Balaclava

Most body heat is lost at the top. This will keep it in. **$29.99**

Product code: DIR10128

Calendar Art Note Cards

From our annual wildlife calendar. **$5**

Product code: DIR10139

Stocking Stuffers

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A. Float Safe

For small valuables, matches. **$3**
Product code: 12210

B. First Aid

Field kit for aches and pains. **$5**
Product code: DIR10077

C. Calculator

For field figuring. **$9**
Product code: DIR10103

D. Mini-traveler

Brush, mirror, sewing kit. **$4**
Product code: DIR10102

E. Keyfob

Quick release from belt loop, etc. **$4**
Product code: DIR10093

F. Keyring

Spring section traps keys in ring. **$4**
Product code: DIR10092

G. Mini-lite

Pocket-size, ever ready. **$5**
Product code: DIR10094

H. Hand Sanitizer

Anti-germ. **$2**
Product code: 10100

Gift Wrap

Finally, a gift wrap for sportsmen. **$4**
Product Code: CES10002

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Waterfowl Stamp and Print by Gerald W. Putt

Image size: 6x9 inches
Overall size: 12x14 inches

Silver anniversary print of the North Carolina Waterfowl Print and Stamp Program presents wood ducks in a swampy hideout. An important source of revenue for the Waterfowl Fund, it supports waterfowl conservation and restoration projects in North Carolina.

Waterfowl Print

$145
Product code: DIR10151

Waterfowl Stamp

$10
Product code: DIR10152

Redbreast Stamp and Print by Duane Raver

Benefits the new John E. Pechmann Fishing Education Center in Fayetteville and supports fishing programs in N.C.

Signed and Numbered Print

$75
Product code: DIR10157

Redbreast Artist Proof Print

$125
Product code: DIR10158

Redbreast Remarque

$15
Product code: DIR10159

Redbreast Stamp

$10
Product code: DIR10160

Redbreast Signed Stamp

$12
Product code: DIR10161

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant. $275
  (under 1 year old—Applicatian must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth. $450
  (ages 1 thraugh 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfawl)
- ☐ Sportsman $500
  (N.C. residents anly age 12 ar alder—includes basic hunting & inland fishing, big game, game lands, traut & N.C. waterfawl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents anly—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents anly—includes same privileges as the Sportsman, plus caastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

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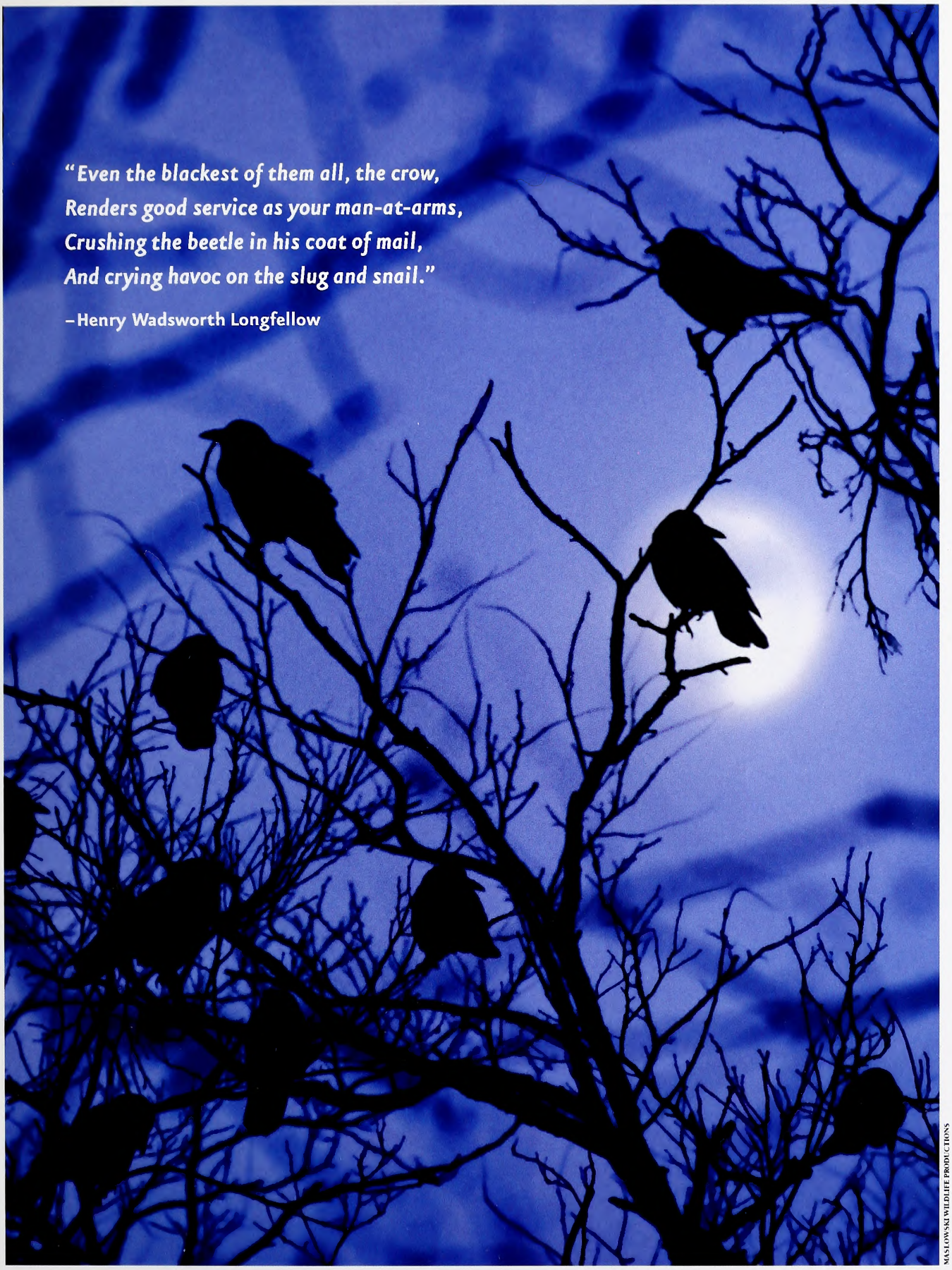

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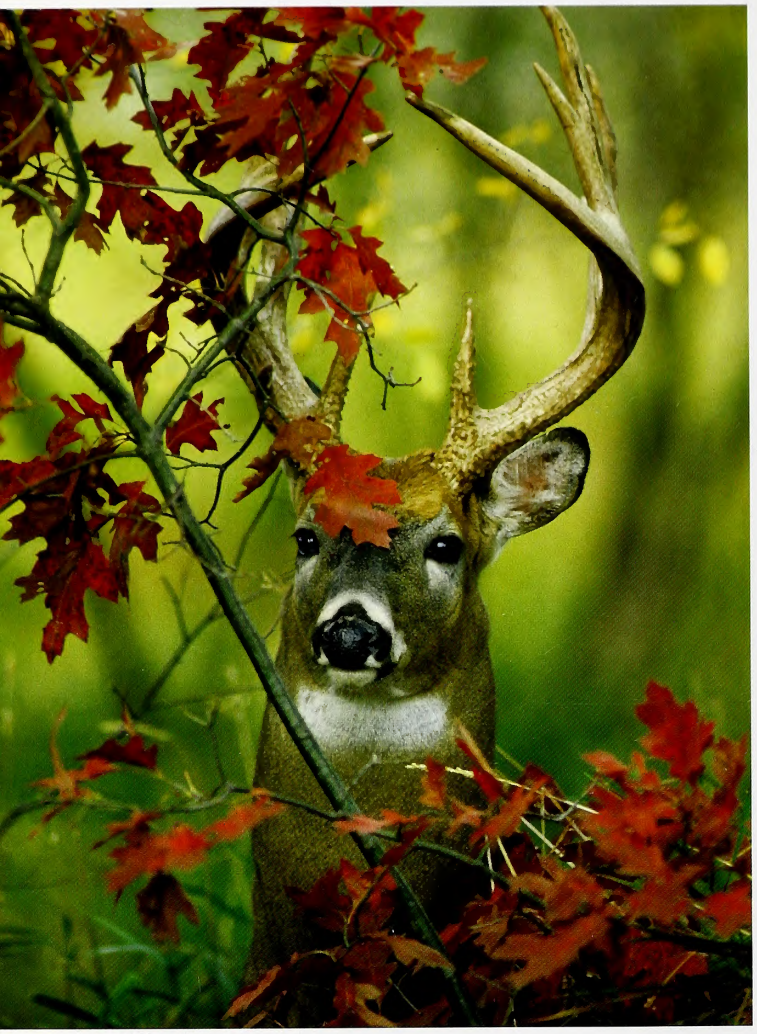
OUTDOOR MOMENT

American crows

IN THE NOVEMBER ISSUE



BILL LEA

HIGH-TAILING IT

Tips, tricks and tactics needed for successfully hunting white-tailed deer in North Carolina's mountains and foothills.

FILLING THE VOID

How do you go about stocking fish in the state's first new reservoir in two decades? Randleman Lake is a case study.

WHITHER THE FERNS?

Ferns grow in many types of habitat, and different species use varied strategies to survive and propagate.

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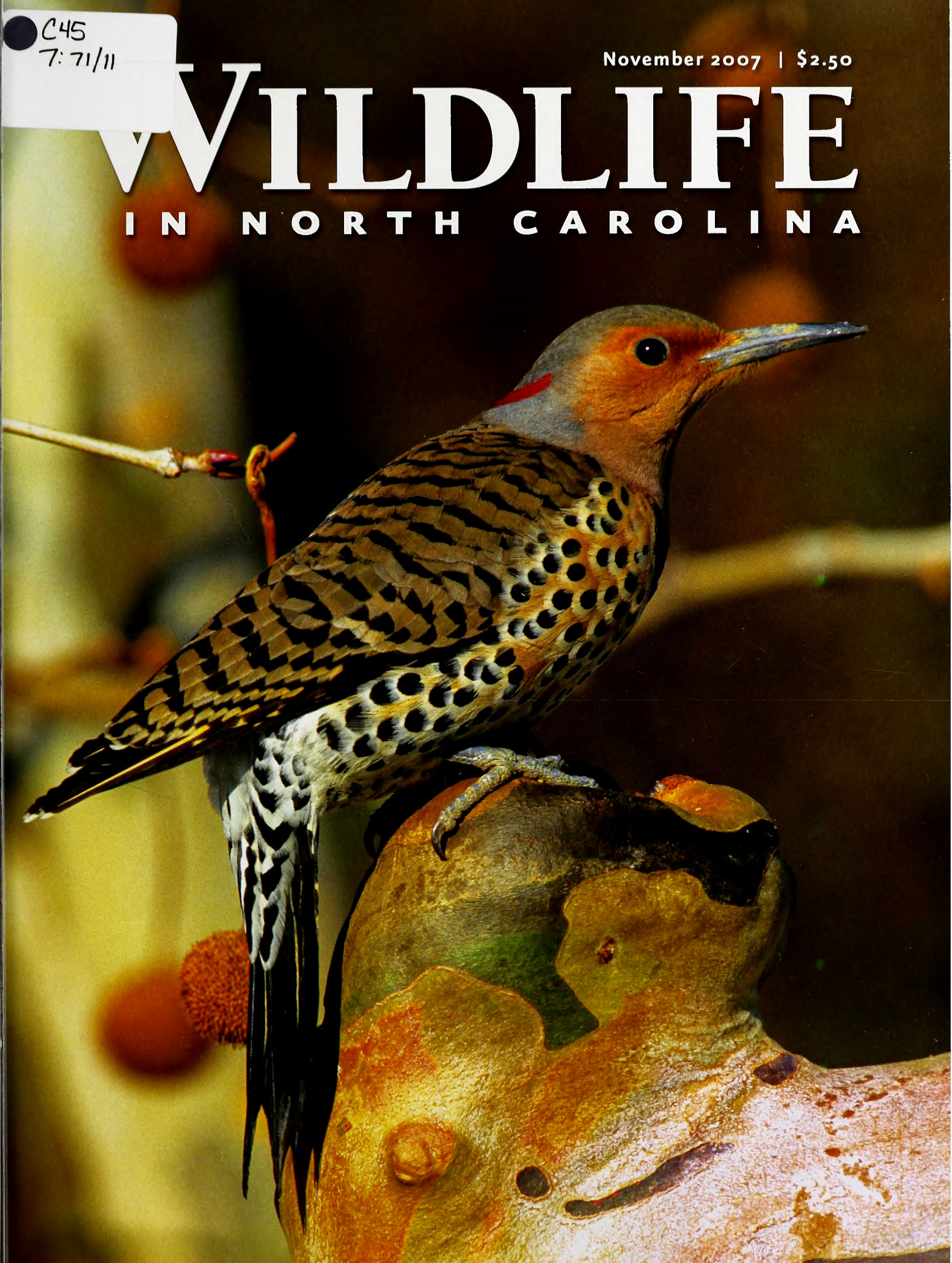

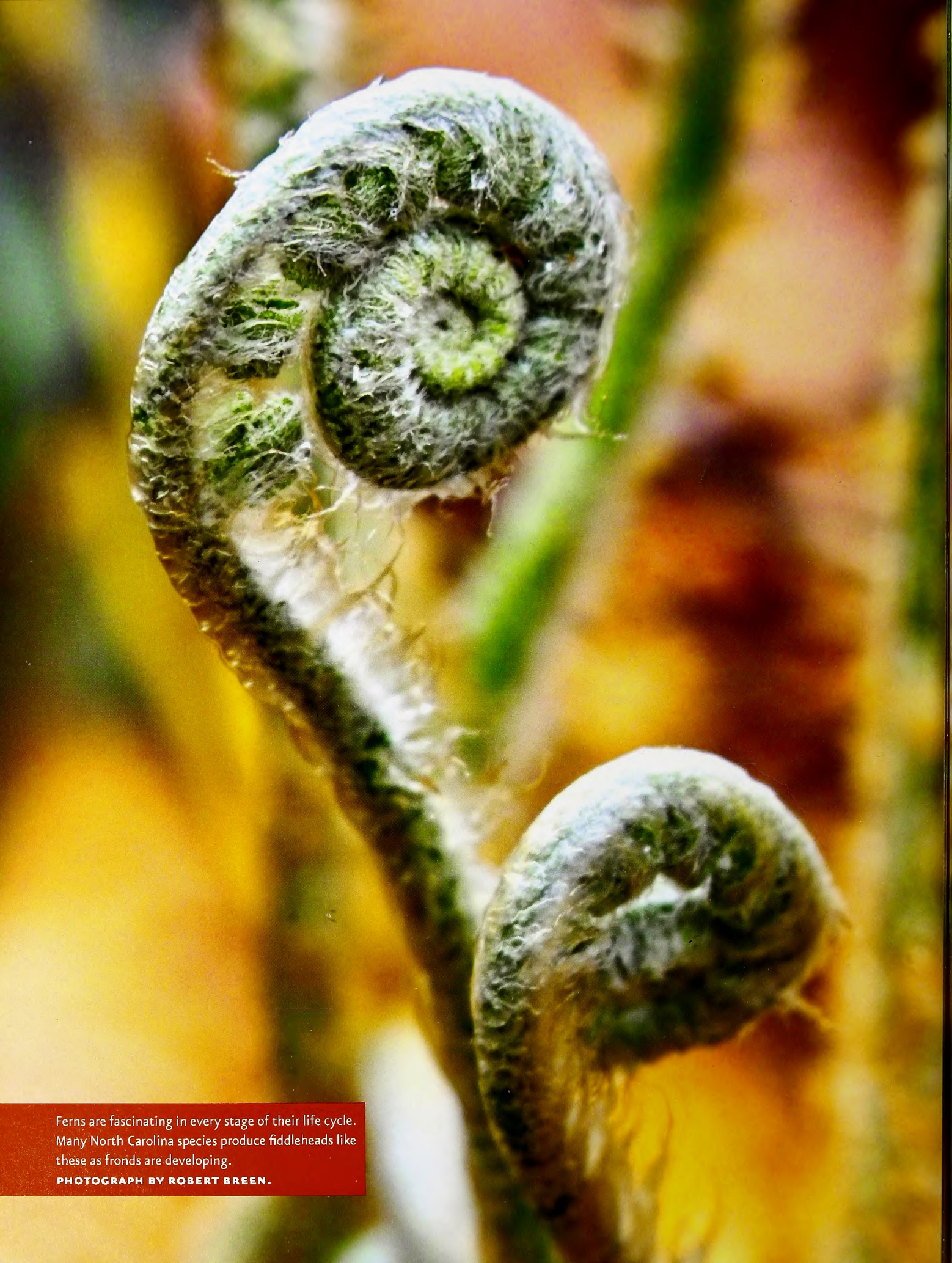

Ferns are fascinating in every stage of their life cycle. Many North Carolina species produce fiddleheads like these as fronds are developing.
PHOTOGRAPH BY ROBERT BREEN.

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Cover: The Northern flicker is a priority species on the Wildlife Action Plan. This common bird is found statewide. PHOTOGRAPH BY MASLOWSKI PRODUCTIONS.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

This month marks the end of one of the longest, most in-depth series this magazine has ever run. "A New Cooperation" (page 20) is the final installment in our quintet of stories on the state Wildlife Action Plan. The series was a challenge for many reasons. First, the actual Wildlife Action Plan document spans a staggering 577 pages. It took quite a bit of time and input to select the right examples from a plan so lengthy and detailed. A lot of discussion, consideration and consultation went into deciding which projects and partnerships to talk about in our stories.

TODD PUSSER

The coal skink is listed by the Wildlife Action Plan as a priority reptile species.

Secondly, writing that much text about the Wildlife Action Plan required the involvement of a sizeable number of Wildlife Commission personnel who were actively involved in the projects we highlighted. All told, 16 different commission staffers contributed text to the series, each of them writing about their area of expertise. Some of them stepped way out of their comfort zones by volunteering to put pen to paper for the magazine.

Thirdly, involving that many authors—plus several editors, numerous reviewers and untold numbers of photographers—took quite a bit of organization and wrangling. Our point person for this duty was Carol Price, the commission's Wildlife Action Plan coordinator. Her boundless energy and knowledge of the plan enabled her to recruit authors for the stories and to help us select photos and graphics.

The Wildlife Action Plan began as a requirement of the federal government to continue receiving the matching grants that are crucial to funding research on rare and endangered animals. Along the way, the document known around our office as "The WAP" became much more than a just compendium of projects. It is now a tool that can be used by the Wildlife Commission and dozens of partners to work together effectively to conserve animals and the places they live.

If you have not read the other four stories detailing how the plan is working all over North Carolina, the entire series is available in PDF form on our Web site, www.ncwildlife.org.

Greg Jenkins

Greg Jenkins

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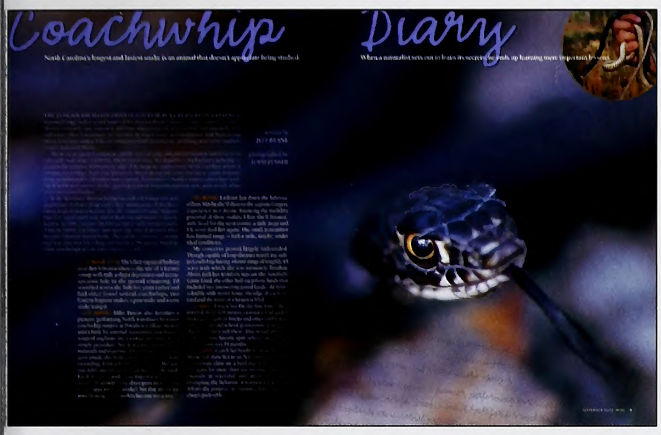

Smart as a Whip

I can't tell you how much I enjoyed the "scientific sentimentality" of Jeff Beane's "Coachwhip Diary" (Sept. 2007). I truly identified with the desire to gain new scientific knowledge coupled with something of a personal attachment that seems to occur when you've followed a particular subject for any substantial amount of time. A great perspective and an informative article. Thanks, Jeff!

Christina Borders
Statesville

Balancing Act

I read with much interest the letter in the September edition expressing concern over the lack of hunting information in the article "Fox Squirrel Tales" (July 2007). I, too, have noticed what seems to be a decline in the amount of hunting articles over the past couple of years in your fine publication. As a subscriber since my first issue arrived in December of 1959, I can recall in the not-too-distant past that your covers nearly always depicted the game species that came into season during that particular month of the year. September usually had a Duane Raver painting of doves, for instance. I feel you have a splendid magazine, but I do miss the philosophy of past years.

Gerald Yokely
Winston-Salem

The title *Wildlife in North Carolina* is just fine, thank you. My first exposure to *WINC* was in 1952 at the home of a friend who was the son of a wildlife enforcement officer in Hot Springs. I was hooked for life at the age of 7. In its infancy, *WINC* was truly a magazine for hunters and fishermen. It was black-and-white, six or eight pages in length and consisted mostly of hunting and fishing stats and a monthly profile of a wildlife officer, topped off with a great wild game recipe. Today, my four grandchildren and I are holders of Lifetime Sportsman licenses. There is a little something for all of us, even my 4-year-old granddaughter who favors ladybugs. Many thanks to the N.C. Wildlife Resources Commission and *WINC* for a job well done!

Jim Harmon Sr.
Arden

I think the magazine does a terrific job of balancing informative articles about wildlife and conservation with wonderful articles about hunting and fishing in North Carolina. I am 56 now and probably have been reading the magazine for about 50 years now. I could not be happier with the content and the presentation of this fine magazine. It is just one of the many things that make me very happy to be a native North Carolinian.

I would remind readers that 200 years ago, all that would have been on your mind would be shooting a rabbit for supper. It is impossible for us to turn our back on all that tradition and history just because we pay others to do our harvesting and processing for us.

Richard L. Tucker
Newport

Days (Not) Gone By

I have been a subscriber of your magazine for over 20 years, and I would like to applaud you for an outstanding service. That said, let me comment on one of your statements in the Editor's Note of the September 2007 issue: "The age of 'The Old Man and The Boy'... has been gone for decades." Not so. I have two toddler grandkids who are already learning the rudiments of a variety of outdoor sports, including hunting and fishing. I also have a 12-year-old nephew who is developing his own skills stalking squirrels, turkeys, rabbits, doves, waterfowl and deer, as well as fishing coastal and inland waters. He adheres to fair chase principles and only takes what he and his family will consume. I have been fortunate to be one of his "old men."

There are now and always will be many "old men" and "boys" in North Carolina. Thanks in part to your magazine, variety in hunting and fishing is still very much alive. Let's not put this tradition to rest, but rather strive to promote its long life.

Tim Galliher
Chapel Hill

Greg Jenkins: It is wonderful that these sporting traditions are alive in your family, Tim. Passing down these traditions directly to children is the only sure way to keep them going. My point was not that no one strives for the outdoors versatility that Robert Ruark wrote about in his classic, but that in his day, everyone did. We will continue to do all we can to promote the wide variety of hunting opportunities in the state.

Bird Boo-Boo

In Sept. 2007's "Variety in the Plain," one of the photos on page 25 was misidentified. The picture of chicks and eggs in a nest was labeled as belonging to a piping plover, but it is actually the nest of a Forster's tern. Wildlife Commission waterbird biologist Sue Cameron caught the error and wanted to clear up some misconceptions about these birds. She tells us that the Forster's tern is a colonial nesting waterbird that nests in groups on estuarine islands. This tern typically nests on marsh islands on top of dense vegetation or on mats of floating dead plants. The piping plover is an inconspicuous shorebird that nests signally along barrier island beaches. This plover nests in sandy areas with little or no vegetation and lays its eggs in a shallow scrape directly in the sand.

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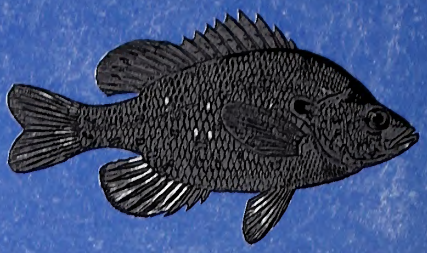
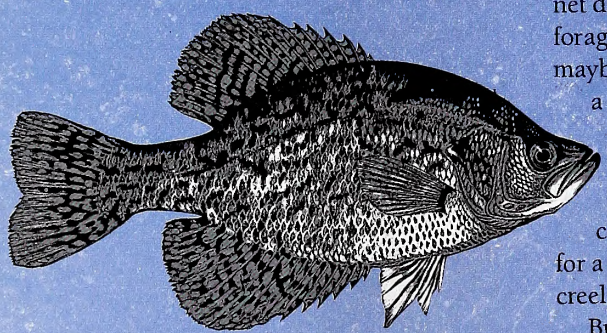


A CLEAN SLATE

written by Dan Kibler



Ninety-nine percent of the time, when biologists with the N.C. Wildlife Resources Commission study how to improve the fish populations in a body of water, it's a lake or stream that's been around a while.

They use electrofishing surveys and trap-net data, look at age structures, discuss the forage base and decide that maybe, just maybe, they need to tweak the regulations a little bit. Maybe they need to protect spawning fish for an extra year or allow more small fish to be taken out for the good of the whole. Maybe the commission raises the minimum size for a keeper fish by an inch or lowers the creel limit.

But what happens when there aren't any fish to study? No baseline data to consult? Nothing but empty water?

It's been more than 20 years in North Carolina since there was a clean slate, a new body of water with which to work. In the early 1980s, three major reservoirs were impounded, all of them around the Raleigh-Durham area. Falls, B. Everett Jordan and Shearon Harris lakes were all examined and scrutinized before the first bass or catfish was ever stocked, and each lake took a little tinkering before it turned into a fish factory.

Enter a new generation of biologists and a new reservoir: 3,007-acre Randleman Lake along the Guilford County-Randolph County border, impounded between 2006 and 2007, almost 40 years after it first appeared on somebody's drawing board as a way to provide drinking water for the thirsty population of a burgeoning Greensboro.

Commission biologists had discussions early on with officials from the Piedmont Triad Regional Water Authority, advising on details about how fish stocks should be handled when the lake opens for fishing—possibly next spring. They surveyed the Deep River basin, looked at the lay of the land and the scope of the project and decided how best to address the questions of which fish populations the lake should hold and how they should get them started. And the biologists realized that it was a special opportunity indeed.

For the first time in more than 20 years, biologists can help determine a new lake's fish populations from the time the reservoir is filled.

"It's a good opportunity for us; we'll get in on the ground floor," said Corey Oakley, a district fisheries biologist who was one of two commission biologists who shepherded fisheries management ideas through the process of the lake's impoundment. "We're starting with very much an empty slate. I think as a biologist it will be interesting to see what changes as time passes."

Over the past 40 years, Roger Jones, Shari Bryant and Brian McRae did a lot of the legwork as district fisheries biologists before they retired or were promoted within the commission. McRae became the commission's Piedmont fisheries research coordinator in 2006 and helped make the final decisions about what fish should go in the reservoir, before turning things over to Oakley.

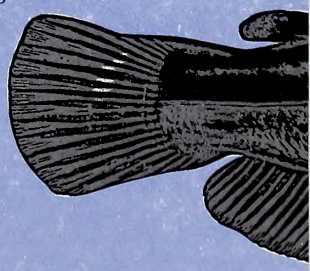
"We had Jordan and Falls 20 years ago, and we had Lake Mackintosh in Burlington 10 years ago, but that was more of a municipal reservoir," McRae said. "Randleman will be bigger than your typical municipal reservoir, but not nearly as large as Jordan or Falls. We were able to work on many of the management ideas and stocking rates with some of the people from the water project."

What's In, What's Out

The first decisions came while the lake was first filling up in 2006, when biologists determined what species they wanted — and did not want — in the lake. McRae said that the popular striped bass/white bass hybrids were out of the question. Randleman is in the Cape Fear River watershed, and the commission has phased out stocking the hybrids throughout much of the watershed as small dams have been destroyed and the lower reaches of the river opened up to spawning striped bass. Because the hybrids are capable of spawning, the commission does not want to continue or implement a stocking program that could interfere with the spawning potential or genetics of the Cape Fear River stock of striped bass.

Striped bass also are not being considered at this time, Oakley said, because of the nature of the new reservoir's makeup. "A problem with Randleman is one we have with some of the other reservoirs in the Piedmont — we don't know if the biological and physical conditions of the reservoir will support a viable striped bass fishery," Oakley said. "Historical evidence suggests that growth and survival of striped bass are limited in habitats with the high summer temperatures and low levels of dissolved oxygen that are common in Piedmont reservoirs in the summer.

"However, Dr. Jim Rice and his associates at NCSU have recently found that forage availability might be even more important than temperature and dissolved oxygen. For example, the striped bass fishery in B. Everett Jordan Reservoir has been very successful, and Jordan typically has less-than-ideal habitat in terms of temperature and dissolved oxygen, but there are plenty of threadfin shad and gizzard shad available. However, it is unlikely that a system such as Jordan will ever produce the trophy striped bass that are found in reservoirs in adjoining states. As for Randleman, we want to see how the system



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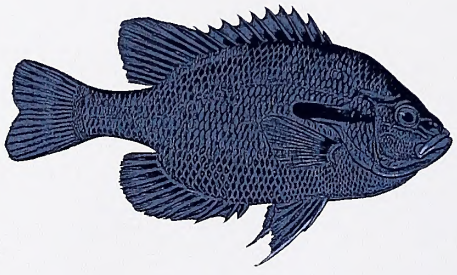
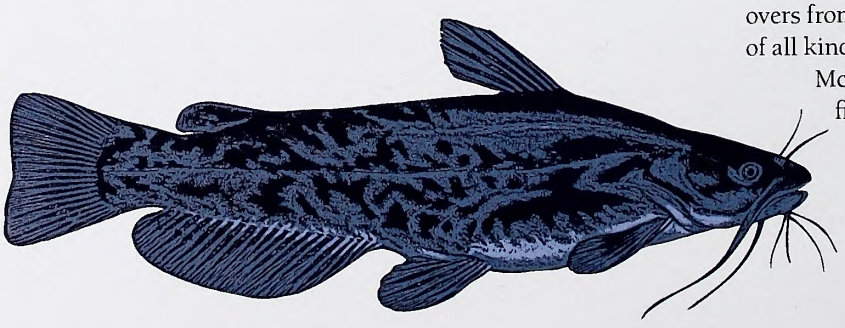


"Randleman will be a very productive lake, very nutrient-filled, because you'll have surrounding municipalities unloading their treated wastewater into the reservoir. The increased nutrients should provide an environment for fish to grow rapidly."

– Fisheries biologist Brian McRae



balances out before we introduce another top-end predator into it."

Biologists determined that they would stock channel catfish and largemouth bass but discovered that they would not need to stock sunfish. "Our surveys indicated that the sunfish populations in the river were viable, and we didn't need any supplemental stocking," McRae said. "If we were going to stock sunfish, we would have staggered the stocking to get them established in advance of catfish and bass.

"Typically, you stock sunfish at one time and bass at another. You stock the sunfish in the fall and bass the following June. That's what you do when you have a pure, clean start. You want the give the sunfish a chance to grow and survive the first winter without having to compete with bass."

This past spring, Oakley ran surveys on the sunfish population in Randleman Lake, which was almost completely impounded, but still a ways from providing water to Greensboro. Nothing he saw surprised him.

Sunfish Aplenty

"We saw a high abundance of sunfish — redears [shellcrackers], bluegills, green sunfish and redbreasts," Oakley said. "We also found crappie already in the reservoir from the river. I'll be surprised if the redbreast sunfish stay in the reservoir, because they're better adapted as a riverine species. The sunfish will probably wind up being what we typically see in Piedmont reservoirs: bluegills and shellcrackers.

"I'll be interested to see how the crappies do. All we found were black crappies, which is pretty typical. We see most of our reservoir populations dominated by black crappies. There were some white perch that were holdovers from the river, and bullhead catfishes of all kinds."

McRae said the commission "is confident the sunfish population has had a good chance to become established and have a good spawn. If we need a supplemental stocking, we can do that in years to come."

As far as the lake's forage base, the native fish from the Deep River took care of that, with gizzard shad being the primary baitfish. The smaller threadfin shad weren't found in any appreciable numbers, and since lakes on the Yadkin-Pee Dee and Catawba systems have had blueback herring introduced, the opportunity for capturing and restocking threadfins was unavailable.

"Randleman will be a very productive lake, very nutrient-filled, because you'll have surrounding municipalities unloading their treated wastewater into the reservoir," McRae said. "The increased nutrients should provide an environment for fish to grow rapidly."

The commission had already decided to stock 60,000 channel cat fingerlings between 2 and 3 inches long either late this year or in 2008. That left McRae and Oakley with only one other fish to think about: largemouth bass.

"We decided to put a five-fish creel limit and 14-inch size limit in place, and we dropped the exception for the two small fish as a safeguard to protect our young bass," McRae said. "And we had been looking at stocking 150,000 largemouth bass as part of the original plan."

Oakley said that the spring 2007 survey found plenty of bass in the lake, natives of the river, and healthy ones at that.

"We surveyed and saw bass already starting to become established in the reservoir from the river," he said. "Most of those fish were about 14 inches or less in length, but they were all very healthy. I can't wait to see how they will do over the next 10 years, because once bass get established in a lake, from a river, they should really begin to grow rapidly. The environment of a reservoir is often not as stressful as a river, allowing for the largemouth bass to grow at a greater rate."

Adding the Bass

Still, biologists agreed that they needed to jump-start the largemouth bass population with a supplemental stocking of 150,000 fish —about 50 per acre. Most of those 1- and 2-inch fish—grown in the commission's Watha State Fish Hatchery—were stocked last May and June.

"That is a significant number to put in at one particular time," McRae said. "The goal was to have those 150,000 spread out over two years, depending on how we could get bass for the hatcheries."

Oakley said that before any bass could be stocked, they had to be raised, and that required brood fish. Commission personnel used electrofishing equipment to capture between 60 and 75 spawning females in the 2- to 3-pound range from four nearby municipal reservoirs that were certified to be free of the largemouth bass virus: lakes Mackintosh and Cammack in Burlington, Higgins in Greensboro and Farmer in Asheboro.

"The number of broodfish taken from those four reservoirs was minimal. All four reservoirs have excellent largemouth bass populations and could withstand the removal of broodfish for one year," Oakley said. "And once we were finished, the fish we used were brought back and released."

Those fish spawned in hatchery ponds and their fry grew to Phase I stocking size. "Stocking the fish at this size greatly increases their survival to adulthood, since it gets them past a critical stage of early life development," Oakley said. He hopes the fingerlings will reach 4 to 6 inches long by the spring of 2008.

How will the fishing be in the lake once all the species are established? When the lake opens, no boats with outboard motors will be allowed upstream from the N.C. 62 bridge, a maximum of 100 boats will be allowed on the lake at any one time, there will be no fishing at night, and a 25 mph speed limit for boats will be put in place.

And Oakley said the commission will likely have to return and provide some fish habitat, because the earthmovers and road graders that cleared the lake bottom did an overly efficient job—much more thorough than at Falls and Jordan lakes, where plenty of stumps were left, especially along the main channels.

"They did a pretty good job of cleaning it up," Oakley said. "The bottom is clean, with minimal regrowth of vegetation before the reservoir was flooded.

"There have already been some trees that have fallen in, and the lake will collect a lot of woody debris coming down the river. But I'm sure over time that we'll have to put some artificial fish attractors out there."

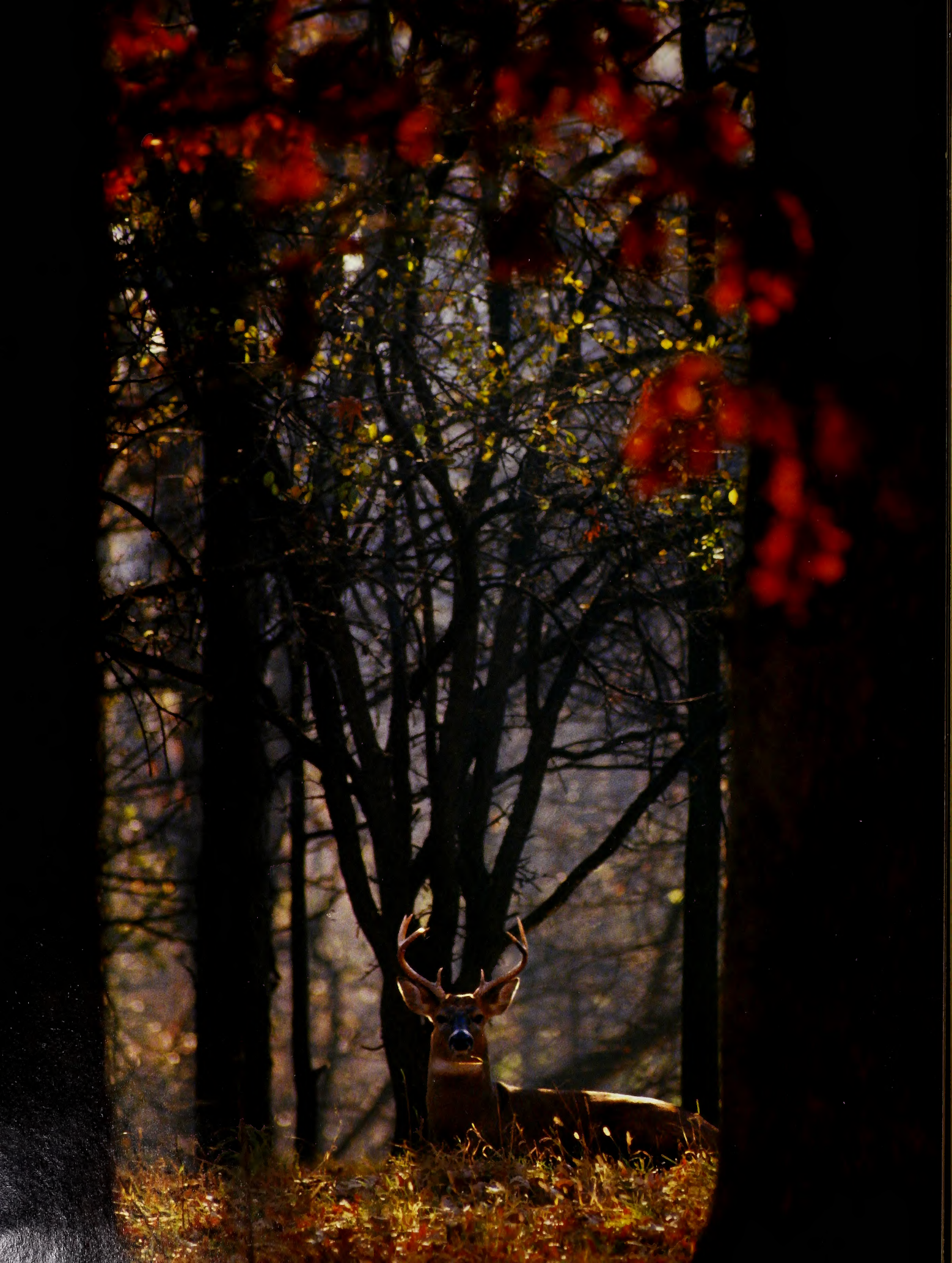
Oakley believes that Randleman will fish very much like a river. Except at the U.S. 220 bridge, just upstream from the dam, the lake is very narrow. "What you see from the 220 bridge is not what the lake is like," he said.

When Randleman Reservoir fills, this area near the U.S. 220 bridge will be the widest part of the lake.

"It doesn't widen out very much at all. There are a lot of turns, and it's only 200 yards wide at some of its widest spots. It's very riverine—a run-of-the-river reservoir."

Greensboro residents may certainly get a return on the $140 million that has been invested in the impounding of Randleman Lake. The return that fishermen get—thanks to the efforts of McRae, Oakley and the commission—well, the hope is that it will be priceless. ◆

Veteran outdoor writer Dan Kibler is the editor of South Carolina Sportsman *magazine and a regular contributor to* WINC.



HUNTING *Ridge-running* WHITETAILS

Simple, effective white-tailed deer hunting strategies for western North Carolina gleaned from decades of experience and fieldwork by an exceptional hunter.

Years ago I was blessed with the opportunity to be shown the ins and outs of white-tailed deer hunting by retired N.C. Wildlife Resources Commission biologist John Collins.

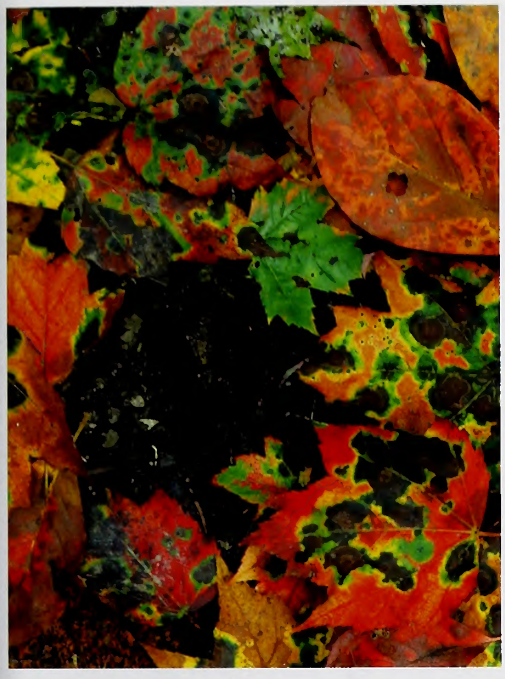
I first met John when I was in my 20s and working at a downtown hardware store. During a conversation with him, I offhandedly commented that I did not know much about deer hunting, but that I was interested in learning about it. He finished his business and left the store, but a little while later he called and offered to take me out on some game lands to share with me some hard-earned expertise gained from his many hours spent in the field. I had to take him up on it.

On this particular occasion and several others, John took the time and effort to show me where deer move and how to hunt them. More important, he explained to me why. Understanding why deer travel at different times of the day has helped me become successful on other pieces of land. The advice and wisdom he gave me have brought home the venison year after year.

The first thing John explained to me was that you need to know the lay of the land, and that starts with a topographical map. Study the topo map, and look where the ridges are. According to John, "Deer are ridge runners."

These trails link up between feeding and bedding areas. When John took me to the game lands and showed me the ridges, he pointed out that every ridge had a main trail that paralleled it. He called these trails "the grand strand." If these places have any type of recent trail traffic activity, they are possibilities worth hunting.

WRITTEN BY JEREMY GRADY • PHOTOGRAPHED BY BILL LEA



The key to hunting white-tailed deer in the mountains is to understand the lay of the land. Recognizing trails that run parallel to ridges as well as saddles that act as natural crossings will yield areas that deer are likely to frequent.

Back in the Saddle

Another type of place to look for on topo maps is a saddle. John called these places "natural deer stands." He explained that deer will cross at the easiest place they can find, and a saddle offers a natural crossing. As a matter of fact, the day he took me up on the game lands, he showed me a natural crossing in a saddle that had evidence that a deer had been field-dressed there. If deer are traveling up a ridge and looking to cross somewhere, the saddle is the most likely place. This is especially true during rut activity, because a doe is likely to cross at a saddle, which in turn will cause a buck chasing her to cross there.

Next according to John is, "putting your time in." This means getting out and doing your preseason scouting. Study the topo map, highlight the ridges and go looking for that "main drag" that runs along a ridge. If possible, rake back some leaves on some of the trails to see in which direction the tracks are heading. John showed me that tracks leading up the ridge are probably heading in the direction of bedding areas, and if there are a lot of tracks, then it may be a better morning hunt area. If most tracks are heading down the ridge, it may be a better evening hunt area. Sometimes you'll find tracks going in both directions. According to John, "Deer use the same trails in the mornings and evenings."

John explained to me that deer travel up ridges in the morning because they're leaving a feeding area and moving up to a bedding area. If you hunt on a piece of property that has some bottoms along a river or lake, deer are very likely to feed in these areas at night. As the morning progresses, deer slowly make their way up the ridges for cover and bedding. If you have access to both bottomlands and ridges on your hunting property, an ideal setup is to sow the bottoms in rye, wheat or peas to draw more deer in to feed.

The Old Trail

After you've identified feeding areas, bedding areas and the trails in between, start looking for traditional deer sign. If you find a lot of rubbed trees, then you probably have some bucks in the area. If there's a scrape in addition to the rubs, then start looking for a straight tree to hang a stand on. Look for droppings as well. Depending on amounts and sizes, this could indicate deer are spending a fair amount of time there. If this sign is left predominantly by does, which it usually is, don't fret. If there's any kind of rut activity happening, the bucks will likely be close by.

If you see an area with a scrape in addition to rubbed trees, it is likely a good place to keep an eye on. If there is rut activity, any sign of does is good because bucks will likely be close by.

One hunting area I used was located on a ridge above some property leased by a hunting club. The deer would feed at corn feeders on that property at night and then filter up to my area in the morning. It was unfortunate for the other hunters' success, but it made for some good hunting for me. If rut activity is happening, bucks will follow the does. Even if there's no rut activity, there's no telling what might walk up the ridge in the morning.

Another reason ridge hunting can be effective is that your scent can be somewhat controlled—and any deer hunter knows the importance of this. As the morning wears on and the air warms up, air currents rise and move up the ridge, carrying your scent with them. Normally, as the deer travel, your scent will move away from them, decreasing the chance of their smelling you. Air currents work the opposite way for evening hunting. As the air cools, the currents move down the ridge, carrying your scent with them and away from the deer's noses.

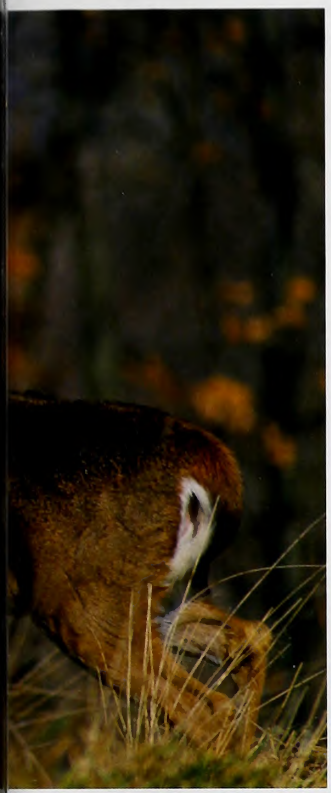
The predominant wind in western North Carolina during rifle season comes from the northwest, and this should be taken into consideration for stand placement. If the wind is blowing into an area you are overlooking, the deer might be able to smell you. This is one reason you need multiple stand locations. One thing you can do to help control scent is wash all your clothes in scent-free detergent. Another trick I learned from John is to dip a couple of cotton swabs in fox urine and place them on each side of your stand. This will help cover your smell.

Whitetail movements are the opposite for evening hunting, as the deer simply travel down the ridges toward their feeding locations. Understanding this fact helps in choosing a better stand-placement area to watch for animals. Depending on the type and amount of sign, John would simply reposition a climbing tree stand to get a view toward the ridges.

My brother, Jason, experienced success this way one muzzleloading season. About 9:30 on a cool morning, I heard a shot from his general direction. When he paged me, he said the deer had antlers but that he was unsure of how many points it had. After finding the place in the woods where he hit the deer, we followed the blood trail down the ridge for about 25 yards to find a seven-pointer lying there. We got him out and then took him home.

After dressing the deer, we realized we had a couple of hours of daylight left and decided to go back for some more hunting. Jason repositioned his stand and wasn't hunting very long before I heard another shot. This time he had dropped a large doe that was traveling down the ridge. He harvested two deer the same day simply by repositioning his stand so that he could effectively look for deer in the directions from which they might come.

John has harvested some of his biggest bucks in the late evening. The last 30 minutes is definitely his favorite time of the day. It's almost like the woods come alive when



the sun begins to go down, because a lot of animals begin to move. John calls it "the magic 30 minutes."

He told me one story in particular about a big eight-pointer he harvested after work one day. When he got off duty, he realized he had enough time to get into his stand and hunt the last hour. The area had some heavy buck sign, and just as the sun began to go down, he saw movement in the woods. This movement had tines. Once he verified that it was a buck, he made a shot and connected.

Rhythm of the Hoofbeats

A white-tailed deer's eyesight is such that the animal has an uncanny ability to spot unnatural movement very quickly. Since John doesn't hear very well, he relies primarily on his eyesight while hunting. He sits very still and looks with his eyes, not his head. He says that younger bucks walk through the woods more carelessly than older deer, making more noise. Older bucks walk very cautiously, and you rarely hear them. They take a couple of steps and then spend time looking and listening. This is one of the reasons they're bigger and older. John explained that you watch for any kind of movement in the woods, such as a flicker of a tail or ear, reflection of light off an antler or slender legs walking. Anytime there's movement like this, he looks through his compact binoculars. He calls this "putting glass on a flicker."

These effective tactics will work on white-tailed deer anywhere you have access to ridges to hunt. John has spent a lifetime studying and hunting whitetails. He fills his tags each and every year and has taken many trophy bucks. I am eternally grateful to him for taking the time and effort to show me what has taken a lifetime for him to learn. I hope that these strategies and tips will help you to become a more successful hunter this deer season.

Jeremy Grady is a freelance writer from Morganton and an occasional contributor to Wildlife in North Carolina.

How the red tide reached N.C.
Cape Hatteras
Florida current
Red tide keeps grip on coast
Scientists say Fla. outbreak flowed to N.C.

A GAME OF *Chance?*

NORTH CAROLINA'S 1987 TOXIC RED TIDE WAS A RARE COMBINATION OF NATURAL FACTORS THAT BROUGHT DISASTROUS RESULTS TO COASTAL AREAS. ALTHOUGH ITS RETURN IS POSSIBLE, MOST SCIENTISTS SAY A SECOND OCCURRENCE IS UNLIKELY.

written by Bill Morris | illustrated by David Terry

On the afternoon of November 2, 1987, Pat Tester looked into her microscope at the National Oceanographic and Atmospheric Administration (NOAA) laboratory in Beaufort and got the shock of her scientific life. The sample of seawater she was studying, collected at Emerald Isle, was full of the algae cells that cause toxic red tides.

It was the first confirmed red tide bloom ever observed north of Florida. Overnight, shellfish became inedible; finfish turned belly-up; shorebirds, marine mammals and even house cats were poisoned. Over the next six months, the microscopic single-cell algae species *Karenia brevis* would cost North Carolina's seafood and tourism industries an estimated $25 million.

For coastal Carolina, it was nothing short of a disaster.

Although many different types of algae contribute to harmful blooms in the world's oceans, the best known by far is *Karenia brevis*, which turns the water a distinctive red color. But off-color water is the least of its harmful effects. As the individual cells die and break up, they release a suite of powerful neurotoxins—poisons that affect the nervous systems of fish, birds and mammals. These poisons are known collectively as brevetoxins, and filter-feeding oysters and clams concentrate them in their flesh. For humans, eating these contaminated shellfish causes a serious, potentially fatal disease called neurotoxic shellfish poisoning, or NSP.

As soon as scientists confirmed the presence of red tide, state authorities immediately began shutting down shellfish beds, right in the prime of the season. Before it was over, approximately 50 percent of the oyster harvesting areas and 90 percent of the clam areas in the state had to be closed.

Newspaper headlines chronicled the story. "Algae plague threatens state tourism industry," the front page of the (Raleigh) *News and Observer* warned. "Red tide claims more shellfish waters," read Morehead City's *Carteret County News-Times*. "Restaurants, workers are idled by red tide," the Associated Press reported.

Television news teams struggled to find a decent camera angle as they recorded interviews inside the dark, crowded NOAA laboratory near Gallant's Channel. Researchers more accustomed to looking into microscopes found the lenses trained on themselves for a change.

Tester remains a NOAA scientist, 20 years after she detected the red tide. She recalls working long hours for weeks on end in the months after that discovery. The federal lab did its best to keep up. State officials were overwhelmed as well. "The phones were going crazy," remembers Tester. "It was a bizarre time."

She recounts a story about cats dying in Cedar Island, probably from airborne brevetoxins. Her memory of Thanksgiving Day 1987 is that she was too tired to cook a turkey.

Without any written record of red tide affecting North Carolina, researchers checked the region's oral history. NSP has its own peculiar set of symptoms—tingling of the lips, nausea, vomiting and ataxia, an inability to coordinate voluntary muscle movements. When the NOAA scientists asked longtime Down Easters if they had heard of a time when people got sick in that way from eating the clams and oysters, the answer was, "Never."

The Crystal Coast's Worst Halloween

The first signs that something was wrong came on October 31. On that unseasonably sunny and warm Saturday, fishermen and beachgoers in Carteret County reported water discoloration, eye and respiratory distress, and skin irritation. Clearly something strange was in the water. Locals and visitors alike wondered if there had been a chemical spill.

Samples soon arrived at the NOAA lab, only a few miles away. Tester, then with NOAA's National Marine Fisheries Service,

immediately knew what she was looking at and what the consequences could be. "This cell is distinctive," she recalls. "It's like having a white whale show up on your front lawn. I knew we were in trouble."

Phone calls went out immediately, to the N.C. Department of Human Resources' Shellfish Sanitation Program and to William Hogarth, then head of the N.C. Division of Marine Fisheries and now director of the National Marine Fisheries Service.

Hogarth quickly signed an emergency closure order to keep toxic shellfish off the market. Robert Benton and Patricia Fowler of the state's Shellfish Sanitation Program set up a water sampling network that soon grew to 117 sites.

The invader was thriving in its new territory. Some samples had concentrations of 6 million to 8 million cells per liter of seawater, and health standards call for shellfish bed closures at concentrations of only 5,000 cells per liter. The highest concentration of cells was nearly 20 million per liter, in a sample taken from just southwest of Beaufort Inlet.

Although the cell is known today as *Karenia brevis*, in 1987 the literature called it *Ptychodiscus brevis* or *Gymnodinium brevis*. The name was later changed to honor Karen Steidinger, an expert on harmful algal blooms (HABs) at the Florida Marine Research Institute in St. Petersburg.

As media coverage spread across the state and beyond its borders, the designation "North Carolina seafood" suddenly became an appetite killer, even though finfish and shrimp were not affected by the closures. It was simply guilt by association, but commercial fishermen, shrimpers, seafood dealers and restaurants were all devastated. Tourism was virtually shut down after people on the beaches and fishing piers were sickened by breathing the brevetoxins, which become airborne as a result of wave action.

Writing in *Wildlife in North Carolina*, Jim Dean described the scene in Carteret County: "Traffic was light and many cottages and businesses were boarded up. No one was fishing on the piers or in the surf. . . . the beach seemed more deserted than normal, abandoned to the red tide."

The local economy suffered so badly that on Dec. 18 Congress passed a bill sponsored by Rep. Walter Jones that enabled fishermen to qualify for low-interest federal loans. Tester and Hogarth were among the witnesses who went to Washington to testify in favor of the legislation.

Nevertheless, some coastal interests still found fault with the way state authorities handled the crisis. One former seafood wholesaler says that he was "basically put out of business by the state of North Carolina." In retrospect, however, quick action by the scientific and regulatory communities probably saved the state's commercial fishermen from the long-term damage that would almost certainly have accompanied an outbreak of NSP traceable to North Carolina.

Despite the precautions, there were 48 confirmed illnesses from consumption of contaminated shellfish, but they were confined to people who had collected their own clams and oysters. No deaths were reported.

Causes and Effects

Today, after nearly two decades of studying harmful algal blooms and the ocean conditions that cause and disperse them, experts are convinced that our 1987 red tide was a fluke, and definitely a natural—not man-made—phenomenon. Most agree that although a repeat performance is possible, it remains unlikely.

North Carolina has been largely immune to red tide simply because our water temperatures are usually too low to support it. The warm waters of the Gulf of Mexico are where *K. brevis* thrives. Red tide blooms have occurred in many different areas within the Gulf, including at the Yucatan Peninsula, along the Texas coast and in Alabama, Mississippi and Louisiana waters. But they are most frequent along the west coast of Florida, where humans, wildlife, fishery resources and the tourism-related economy are all regularly affected. Fish and bird kills are common sights during red tides. In 1996 more than 150 manatees, an endangered species, died during a prolonged red tide along the southwest Florida coast.

Red tide has a long history. Reports of discolored water and its effects in tropical Atlantic waters were recorded in ships' logs as early as 1530. Massive fish kills off the west coast of Florida have been documented since 1844. According to the writings of 16th-century Spanish explorers, the Tampa Bay Indians long noted the seasonal fish kills now associated with red tide blooms.

In southwest Florida, blooms have been observed in 38 of the last 40 years. Most last three to five months, and they may affect hundreds of square miles. Occasionally, blooms continue sporadically for as long as 18 months and may affect thousands of square miles.

Surprisingly, blooms do not originate in nutrient-rich inshore waters; they start far offshore in nutrient-starved areas. In the Gulf of Mexico, blooms begin between 11 and 45 miles offshore, on the continental shelf or at the shelf edge. Low concentrations (fewer than 1,000 cells per liter) of *K. brevis* live in these waters throughout the year. What causes them to bloom is characteristically associated with the intrusion of deeper, offshore waters onto the shelf.

"It's an extremely efficient organism," Tester says. "They can hang out almost indefinitely in the oligotrophic ocean." Oligotrophic waters are by definition lacking in plant nutrients.

Blooms may occur in the Gulf any time of the year, but more than 70 percent of the observed outbreaks have begun in late summer and fall. Whether a bloom will grow larger, and whether it will be transported onshore and impact beaches and bays, are determined largely by currents.

Although there is speculation that water pollution may contribute to the duration of these events, red tide in the Gulf of Mexico is a natural phenomenon. According to Hans Paerl of the UNC Institute of Marine Sciences, no unusually high nutrient levels or pollution events preceded the 1987 North Carolina red tide.

1987: What Happened and Why

If red tide blooms are usually confined to Florida, what caused such a virulent outbreak here?

By 1989, scientists believed they had a good answer to that question. Tester and her co-authors, Fowler of the N.C. Shellfish Sanitation Program and Jefferson Turner

of the University of Massachusetts at Dartmouth, identified the culprits as an unusually calm weather pattern combined with a meandering warm-water filament of the Gulf Stream. There has never been any convincing evidence that the 1987 red tide originated in our waters.

"The most likely source of these cells was a bloom off southwest Florida in September 1987," the authors wrote in the journal *Coastal and Estuarine Studies* (Volume 25 [1989]). "Approximately 29–39 days after this bloom there was a strong shoreward intrusion of the Gulf Stream onto the continental shelf of North Carolina."

From previous research into Gulf Stream transport, it was known that test bottles tossed into the current off southwest Florida would travel anywhere from 25 to 50 miles a day. At that rate a parcel of water loaded with red tide bloom could easily have moved from off Naples, Florida, to Emerald Isle in time for Halloween.

Scientists know that HABs become entrained in the Gulf Stream frequently, but they are dilute in that giant river of saltwater and don't do any harm. What happened in 1987 was the exception.

Looking at satellite imagery from late October 1987, it's fairly easy to see a filament of the warm Gulf Stream waters curling toward the shore south of Cape Lookout, an area of the South Atlantic Bight known as Onslow Bay. It is not unusual for eddies (or back-currents) like this to form. But in this instance the eddy of warm water carried with it sky-high concentrations of the red tide that had originated off Florida's southern Gulf coast.

The 1987 red tide was actually caused by a series of events, a freakish combination of ocean currents and weather patterns that had begun more than a month earlier on the southwest coast of Florida. "None of these events is rare," says Dr. Tester. "But all of them occurring sequentially is."

In the fall and winter of 1987, coastal winds were unusually calm. Warm water continued to pump in from the Gulf Stream. And the bloom continued to linger until it moved southward and finally dissipated off Myrtle Beach, S.C., in mid-February 1988. State officials continued testing shellfishing beds. Although some were reopened soon, the last affected areas remained closed until May 6, 1988. By then the coastal economy had suffered terribly, and many blamed the media.

"Some media were fair," recalls Tester. "Some were not, but we did a great deal of education and warned others that if they 'spun' the story, we would not return their calls or provide further information to them. This did a great deal to help keep the coverage from getting too sensational."

The impact on the coastal economy has been conservatively estimated at $25 million (in 1988 dollars).

Forecasting Harmful Algal Blooms

Fortunately, scientists aren't simply studying red tide blooms, they have developed a way to predict them. Although there's still no way to prevent the consequences, forecasting blooms helps communities prepare and gives shellfish sanitation authorities warnings about where beds may need to be closed.

Richard Stumpf of NOAA's lab in Silver Spring, Md., has spearheaded the HAB Bulletin effort, which uses satellite imagery, field observations and weather buoy data to assess bloom location and movements. Steidinger and Tester, along with Gary Kirkpatrick of the Mote Marine Laboratory in Florida, are among those who have also contributed.

The key is that blooms are preceded by a jump in chlorophyll in the water. The HAB monitoring program uses satellite imagery from NASA's SeaWiFS (Sea-Viewing Wide-Field-of-View Sensor) program. The SeaWiFS instrument orbits the earth aboard the SeaStar spacecraft. Areas near vulnerable shellfish habitats that have high chlorophyll or show changing conditions can be closely monitored. Conditions are posted to a special NOAA Web page twice a week during the HAB season. The HAB Bulletin system became operational in the eastern Gulf of Mexico in 2003, and so far the forecast has been accurate 83 percent of the time.

From her office in Beaufort, Tester reviews the HAB bulletins from the Gulf of Mexico, and she is on the automatic notification system when blooms are detected.

"We assess the potential for transport from a bloom, factoring in the coastal conditions such as wind and currents. Also, from time to time we have sampled offshore and at our inlets when we thought it might be necessary."

And will our luck hold out? Or will we one day see a repeat of 1987?

"I think it is probabilistic, and the probabilities are on our side," Tester says, "unless the equation changes with changes in the environment."

That remark ties into a prescient observation that Tester made at the height of our own red tide crisis. The Jan. 27, 1988, *Carteret County News-Times* paraphrased her: "Though red tides did appear to be increasing worldwide, the increase was probably more attributable to the greenhouse effect, the global warming most scientists believe is occurring due to increased burning of fossil fuels."

It's possible that global climate change will turn out to be the wild card in our game of chance with red tide.

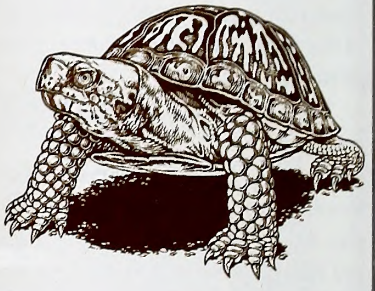
CARTERET COUNTY NEWS-TIMES

...me fishermen to get by, others won't

Bill Morris, author of the novel "Saltwater Cowboys," lives in Beaufort.

A New Cooperation

Wildlife Action Plan KEEP COMMON ANIMALS COMMON



Bringing together new collaborators, stakeholders and partners across the state to focus on comprehensive wildlife needs has ushered in a new era of wildlife conservation.

This is the last of a five-part series about North Carolina's Wildlife Action Plan. This final piece will focus on statewide initiatives.

MARCH	INTRODUCTION TO THE PLAN
MAY	MOUNTAIN REGION
JULY	PIEDMONT REGION
SEPTEMBER	COASTAL PLAIN REGION
NOVEMBER	**STATEWIDE PROJECTS AND PARTNERSHIPS**

Wildlife agencies have been around for a long time doing game and fish restoration and management, all the while supported mainly by hunters and anglers. The long-term trend is for wildlife conservation to be broader in scope. Twenty years ago, many states had small, fledgling nongame or wildlife diversity programs with minimal or no funding and few projects. Programs focused mainly on efforts to conserve and restore endangered species.

The completion of the N.C. Wildlife Action Plan on 2005 changed all that. It introduced a new approach to collaborative conservation, and a new understanding for a diverse array of interest groups that have not always read from the same script. The advent of the Wildlife Action Plan ushered in a new era of collaboration, partnerships and comprehensive conservation focus that has never been seen before.

This series of articles has highlighted Wildlife Action Plan projects and initiatives under way in North Carolina's Mountains, Piedmont and Coastal Plain. The stories have shown a few examples of the wide range of projects under way to address the needs of wildlife and goals of wildlife conservation. The growth of interest, scope and effort towards a more comprehensive approach to conservation is evident not only in these regional examples, but in the language and thought processes of agencies, organizations and the minds of citizens.

The Wildlife Action Plan is influencing this new approach at the state and national levels, too. Statewide initiatives and projects such as the Landowner Incentive Program, the Forest Landbird Legacy Program, Recovery Land Acquisition and numerous others are all coming together to address needs and actions identified in the plan. Every state has completed a Wildlife Action Plans, and now regional and national organizations such as the Southeastern Association of Fish and Wildlife Agencies are collaborating more than ever before to address the issues identified through this new approach. Here, we take a

written by CHRIS MCGRATH

look at several examples of statewide initiatives that are contributing to our goals of protecting rare creatures and keeping common animals common.

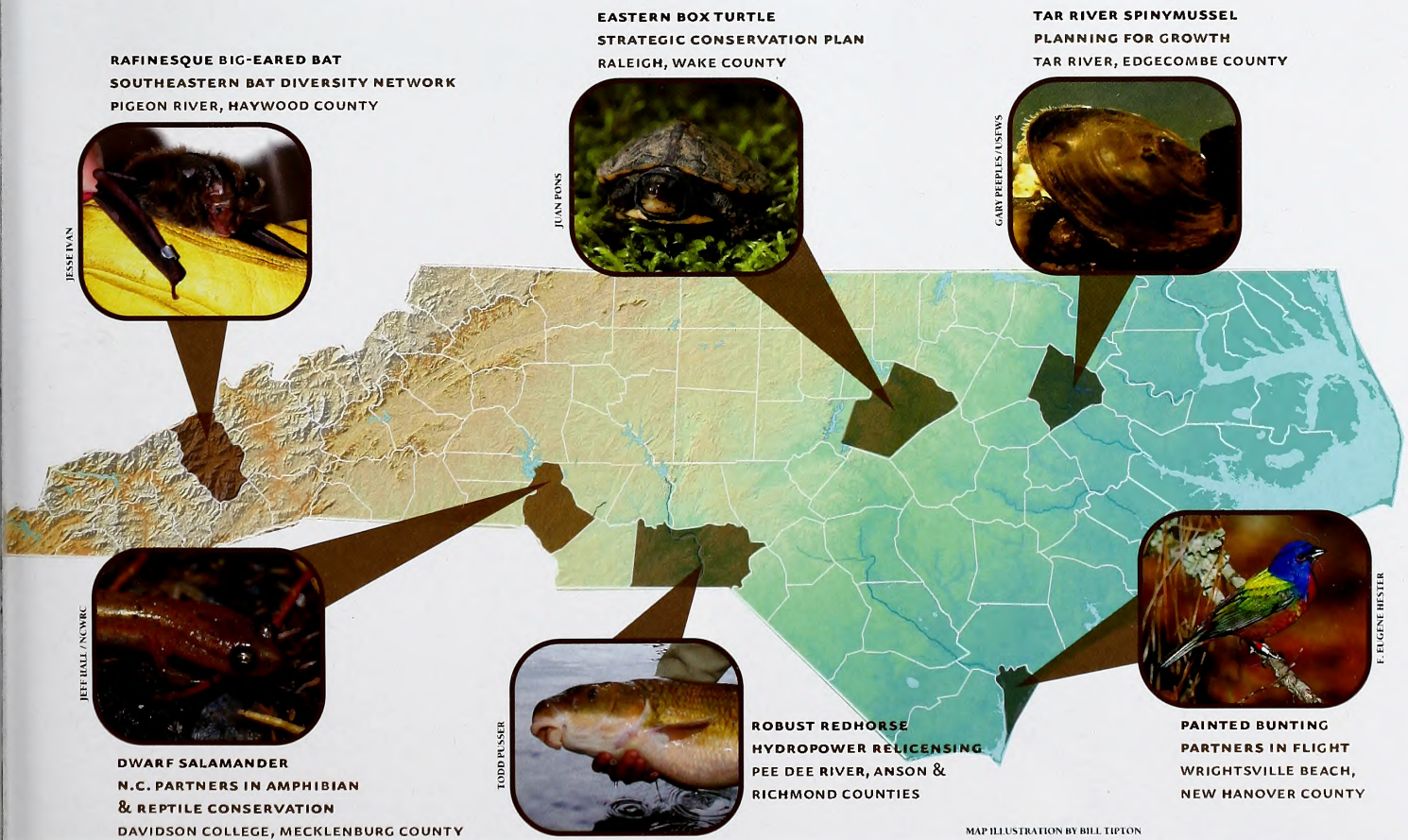
Never before has there been such a high level of collaboration toward the goal of comprehensive wildlife conservation that the plan makes possible. Partnerships with a host of individuals and organizations dramatically alter the scope of participation from anything experienced before. Partnerships with colleges and universities to study distribution, life history and habitat needs are numerous and increasing. Collaborations with other local, state and federal agencies to prioritize and protect significant natural resources and develop new approaches to conservation are coming along daily.

The Wildlife Commission is more engaged with an array of nongovernmental organizations in pursuit of the goals and objectives of the plan, too. A part of this new collaboration is the greater availability of funding to help collectively achieve goals. The Wildlife Action Plan can focus and leverage existing funding, but it can also help develop new funding that will benefit conservation.

Sister agencies within state government have partnered on projects for many years. The Wildlife Commission's Nongame and Endangered Wildlife Program has often received grants to facilitate working together with the N.C. Natural Heritage Program to inventory natural resources around the state. The Wildlife Action Plan has facilitated a new collaboration with the Natural Heritage Program to share funding for two aquatic ecologists. Their focus is galvanizing local, state and private partners to identify and initiate land conservation in priority watersheds to protect aquatic animals and their habitats.

The Wildlife Commission also is partnering with the Conservation Trust for North Carolina to develop a comprehensive program to share information about the plan's priorities with local land trusts. The commission is forging new relationships in some cases, strengthening others and working to make

PROPAGATING PARTNERSHIPS To be effective, statewide initiatives such as the ones shown below need multiple partners working together. The Wildlife Commission is leading the way or helping with each of these projects or programs in conjunction with universities, nonprofits, industry or other state agencies.



THREE STATEWIDE INITIATIVES MAKE GREAT CONSERVATION STRIDES

The N.C. Wildlife Resources Commission has embraced a trio of organizations on regional, national and international levels by hiring personnel to coordinate the groups' work in North Carolina. Representatives of Partners in Flight, Partners in Amphibian and Reptile Conservation and the Southeastern Bat Diversity Network all work for the commission to conserve populations of these types of animals. By fostering many types of partnerships, these three groups have made a real difference in the conservation of these ecologically critical creatures.

N.C. PARTNERS IN FLIGHT

Neotropical migratory songbirds spend their summers nesting in North America and then fly to Mexico, Central America, the Caribbean and parts of South America for the winter. These birds include beloved and well-known species such as the ruby-throated hummingbird, purple martin and wood thrush. Many neotropical migrants breeding in some parts of North Carolina are vividly colored and unforgettable, such as the adult male scarlet tanager, painted bunting or rose-breasted grosbeak. Some, like the painted bunting of the immediate southern coast, have very narrow ranges in our state. Dozens of these migrants nest in North Carolina, and some fly back and forth across the Gulf of Mexico in nonstop flights each spring and fall to do so.

In 1993, the N.C. Wildlife Resources Commission formed the N.C. Partners in Flight (NC PIF) program to promote and improve the conservation of migratory birds and their habitats. This program is part of the International Partners in Flight Initiative originally organized in 1990 to create partnerships among government agencies, conservation organizations, industries, academia and concerned citizens to further migratory bird conservation. The main goal of the current NC PIF program is to increase communication, cooperation and collaboration among a diverse set of statewide partners to improve the overall status of birds of all types through monitoring, research, management and protection efforts and strategies.

In addition, ongoing bird identification workshops for natural resource professionals and presentations related to bird conservation are conducted throughout the state by various partners. Partners in Flight provides technical guidance to government agencies and many others on quality bird management options. Each spring since 1993 there have been programs and events throughout the state related to the importance and conservation of birds via International Migratory Bird Day. Many materials on birds and bird conservation, as well as volunteer opportunities, are available on the NC PIF website at http://faculty.ncwc.edu/mbrooks/pif/.

Keeping common birds common is a central theme of the N.C. Partners in Flight program. Anyone can help do just that by making certain simple lifestyle choices that benefit birds and other wildlife.

N.C. PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION

Reptiles and amphibians are important components of healthy ecosystems in part because they can be used as indicators of overall environmental health. Worldwide declines in both groups of animals prompted the creation of Partners in Amphibian and Reptile Conservation (PARC) in 1999.

PARC was based on the Partners in Flight model set for bird conservation. Groups represented within PARC include state and federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, the energy industry, universities, herpetological organizations, research laboratories, forest industries and environmental consultants.

The N.C. Wildlife Resources Commission decided to support this

continued on page 24

sure that conservation dollars, whether from public or private sources, are being focused upon the most important places and the most critical needs.

Davidson College's Herpetology Lab, which studies reptiles and amphibians, is partnering with the Wildlife Commission and just about anybody with an internet connection. You see, the Wildlife Action Plan notes that we lack information about the current distribution and status of many reptiles and amphibians. So Mike Dorcas and Steve Price at Davidson worked with the commission to develop an online herpetology atlas. Anybody who spots a reptile or amphibian in North Carolina can register at the site (www.carolinaherpatlas.org) and record species and locations, upload pictures to verify species identification and do a bunch of other things. It is an amazing tool that will provide abundant information on these poorly studied animals. It's a relatively inexpensive way to gather large amounts of information, it provides people with an opportunity to participate, and it has a number of really cool educational applications built to help generate children's interest in conservation.

North Carolina boasts an abundance of outstanding educational institutions, and many of them are working with a host of partners (including the Wildlife Commission) on high-priority Wildlife Action Plan species and issues. The commission is partnering extensively with N.C. State University and numerous other schools on a wide range of research topics: investigating and evaluating bird monitoring protocols, studying Swainson's warbler breeding ecology, figuring out the life history of Carolina heelsplitter mussels, working to develop captive breeding capacity for other freshwater mussels.

Since 1998, the Wildlife Commission has been very involved with the relicensing of hydropower dams in the state. Nongame wildlife has played an important role in most of these efforts because most of the state's priority nongame species are aquatic.

The Appalachian elktoe mussel was instrumental in making the case for restoring water to a 9-mile-long stretch of the Cheoah River that had stream flow diverted for more than 75 years. Field studies conducted during the relicensing process indicated that only a handful of mussels remained in the river after many decades of low flow conditions. A new flow pattern enacted in 2005, designed to mimic a natural stream, has already improved habitat for the elktoe and many species of fish.

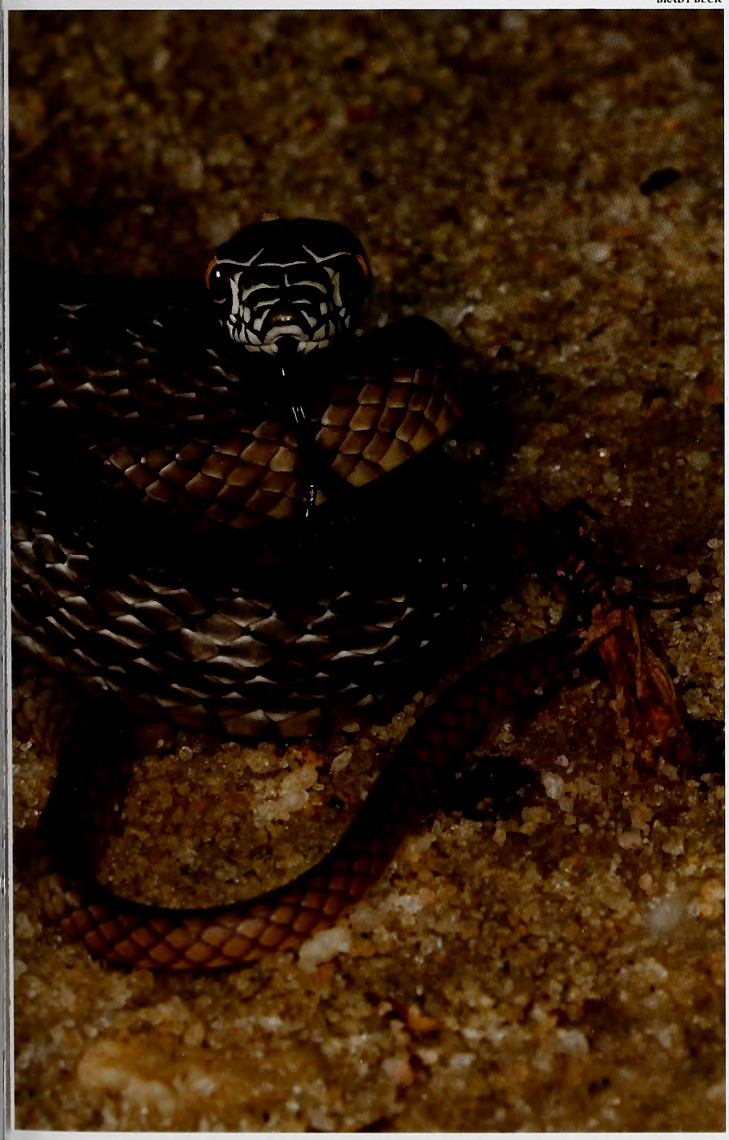
Statewide projects help protect habitats for the rare water shrew (far left), the pine barrens treefrog (top left), the mirror shiner (top right), the Northern flicker (lower right) and the coachwhip.

The Wildlife Action Plan *brings it all together.*

Us, them, game, nongame, plants, water, hunters, watchers, anglers, consumers, wildlife recreationists—*you name it—there is something in there for everyone.*

TODD PUSSER

STEVE FRALEY/NCWRC



BRADY BECK

BRADY BECK

continued from page 22

national effort by hiring a statewide coordinator and starting a North Carolina chapter of PARC in 2004. NC PARC has three technical working groups which regularly meet and discuss various aspects of reptile and amphibian conservation. The organization maintains an interactive Web site that allows members to keep up to date on the three working groups' projects and news related to amphibians and reptiles in North Carolina (www.ncparc.org).

Education about reptiles and amphibians is one of the most important facets of NC PARC because these animals are often perceived as dangerous or of little environmental or economic value. Working to change these perceptions, members of the Education & Outreach working group give talks to organizations, attend festivals, visit schools and present workshops about the conservation of reptiles and amphibians. Other initiatives include producing brochures, media relations and promoting PARC publications of such as the recently published "Habitat Management Guidelines for Amphibians and Reptiles of the Southeastern United States."

The Research, Inventory, Monitoring & Management working group has developed an online registry of North Carolina herpetologists to facilitate communication and collaboration among researchers. A research bibliography is also being compiled to help locate relevant literature on the state's amphibians and reptiles. This group helped develop the Carolina Herp Atlas (www.carolinaherpatlas.org), a repository for species locality data, including photo documentation, from professionals and amateurs. Members of the working group were instrumental in developing the state's Calling Amphibian Survey Program (CASP) for monitoring frog and toad populations and distributions. Routes have been run in 2006 and 2007, and additional volunteers are needed to conduct routes in 2008. Find out more at www.ncparc.org.

The Policy, Regulation & Trade working group handles issues surrounding the legal status of reptiles and amphibians. Its members took a stand and supported a ban on the use of gill nets in the flounder fishery because of excessive bycatch that sometimes includes sea turtles. This group was also heavily involved in drafting regulations limiting the commercial harvest of land and freshwater turtles. Currently, this group is working hard to draft a fair and balanced system for permitting or licensing owners who keep certain inherently dangerous animals such as giant constrictors, venomous reptiles and crocodilians.

Opportunities for involvement in NC PARC abound. The only membership requirement is an interest in the conservation of amphibians, reptiles and/or their habitats. Membership is free — just by e-mail NC PARC coordinator Jeff Hall at jeff.g.hall@earthlink.net. Individuals from all walks of life, all professions and all herpetological skill levels are welcome to join. Diverse membership creates a more broadly reaching voice for the conservation of North Carolina's rich amphibian and reptile heritage. So join a working group, volunteer to survey a CASP route, or add a record to the Carolina Herp Atlas.

To learn more about NC PARC, browse through our website (www.ncparc.org) and the National PARC website (www.parcplace.org).

SOUTHEASTERN BAT DIVERSITY NETWORK

Bats play a vital role in ecosystem health and are crucial to maintaining natural balance. All state wildlife action plans in the southeastern United States list a number of bats among the mammals of greatest conservation need. All of these plans identify habitat loss and degradation of habitat as a major conservation concern for bats.

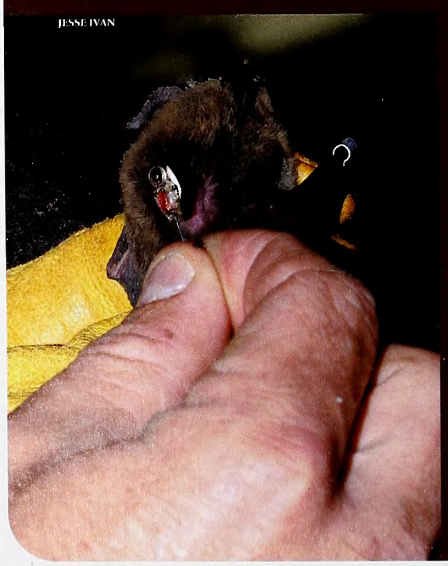
Many bats range widely, regularly cross state boundaries in seasonal migrations, and use a variety of habitats. Efforts to maintain the diversity of bats — to keep common species common and to increase the populations of species in decline — must include actions and collaborations at local and landscape levels.

Recognizing this, in 2005 the N.C. Wildlife Resources Commission partnered with a nonprofit foundation, the Southeastern Bat Diversity Network (SBDN), to support a staff position to facilitate bat conservation efforts in the Southeastern United States. The main goals of the SBDN are similar to those of other focus groups — to increase communication, cooperation and collaboration among a diverse set of state and regional partners. The commission/SBDN partnership to support a position devoted entirely to bats is unique in the United States and represents a model effort to provide more focused and unified efforts across the region for this group of mammals.

A major project of the position is a review and synthesis of bat information in the state wildlife action plans that comprise the 16 states in the region. Products resulting from this effort will be available to land managers and agency personnel in late 2007. This synthesis will provide a valuable regional baseline and will facilitate partnerships and collaborations by identifying common trends and concerns.

Providing this kind of information serves to better inform local efforts, such as land acquisition needs for North Carolina's Strategic Conservation Plan, and more broad-scale efforts like those in place to protect bottomland hardwood forests, a habitat type that is imperiled at www.sbdn.org.

– Mark Johns, Jeff Hall, and Mary Kay Clark



The Southeastern Bat Diversity Network helped coordinate the efforts of biologists to implant transmitters in bats in Haywood County near the Pigeon River.

WALKER GOLDER

The red knot visits North Carolina during its amazing 9,000-mile migration from its Arctic breeding grounds to South America.

Mussels and nongame fish have been important factors in several other hydropower relicensings in western North Carolina river basins such as the Little Tennessee, Tuckasegee and Hiwassee. These species have included spotfin chub, sicklefin redhorse and wavy-rayed lampmussel. Ecologically equivalent species are currently playing a large role in changing the management of river flows in the Yadkin River. Priority nongame species there include robust redhorse, Carolina redhorse, Roanoke slabshell and alewife floater.

In all these relicensing proceedings, the study, design and negotiation phases were driven, in substantial part, by the needs of rare nongame species. Providing more natural water flows will benefit not only these species, but the entire aquatic community.

In the Wildlife Commission, it's not game or nongame anymore. It's the whole package — animals and their habitats. The commission is using its personnel on several projects in the Cooperative Upland-habitat Restoration and Enhancement (CURE) Program to prioritize research and management on grass/shrub bird species. There are birds such as Bachman's sparrows and red-cockaded woodpeckers, along with bobwhite quail in those habitats.

As the population of North Carolina continues to grow and more land is developed, the strain on wildlife resources increases. However, with effective planning and foresight, we can work together to reduce the conflicts between growth in the state and its wildlife resources.

In 2006, the Wildlife Commission worked with the N.C. Department of Natural Resources, the N.C. Department of Transportation and the U.S. Fish and Wildlife Service to produce a 20-page booklet entitled "Swimming with the Current: A Guide to Help Local Governments Protect Aquatic Ecosystems While Streamlining Environmental Review." This booklet details the importance of aquatic ecosystems, describes the environmental review process, and provides suggestions for minimizing impacts to aquatic ecosystems.

As a complement to "Swimming with the Current," the Wildlife Commission has organized a series of workshops entitled "Planning for Growth." These workshops discuss ways that communities can plan for growth so that impacts to wildlife are minimized. For more information on "Planning for Growth" or "Swimming with the Current," go to www.ncwildlife.org/planningforgrowth.

The Wildlife Action Plan brings it all together. Us, them, game, nongame, plants, water, hunters, watchers, anglers, consumers, wildlife recreationists — you name it — there is something in there for everyone.

N.C. Wildlife Resources Commission staff contributing to this article included the following: Wildlife Diversity program coordinator Chris McGrath, Partners in Flight coordinator Mark Johns, Partners in Amphibian and Reptile Conservation coordinator Jeff Hall, hydropower relicensing coordinator Chris Goudreau, special project coordinator Vann Stancil, Southeastern Bat Diversity Network coordinator Mary Kay Clark and Wildlife Action Plan coordinator Carol Price. Kim Douglass is a conservation planner with the N.C. Natural Heritage Program.

WHICH MILLION ACRES SHOULD WE CHOOSE?

In June 2000, the N.C. General Assembly passed the Million Acre Initiative. Its goal is to protect 1 million acres of conservation land, farmland and open space by December 2009. Land in North Carolina is being quickly converted from natural habitats into urban landscapes to accommodate the need for residential and industrial development. The purpose of the Million Acre Initiative is to protect for future generations the state's many natural resources — a spectacular array of animals and plants, clean water to sustain wildlife and humans, beautiful hiking trails, fishing waters and hunting lands, fertile farmland, and outdoor recreation areas. The N.C. Department of Environment and Natural Resources coordinates the Million Acre Initiative.

But which of North Carolina's 31 million acres are most valuable, and which are most threatened? To assess this across the state, a systematic way to identify and prioritize essential, high-quality natural resources across the state is needed. In early 2007, work began on the Strategic Conservation Plan to address this need. Spearheaded by the N.C. Natural Heritage Program, this effort reflects a state-of-the-art analysis and evaluation method. Digital maps are being collected from various sources to pinpoint where the state's natural resources can be found. Map contributors include the Natural Heritage Program, the N.C. Division of Water Quality, the state Division of Marine Fisheries, The Nature Conservancy, Audubon, the U.S. Fish and Wildlife Service and the N.C. Wildlife Resources Commission.

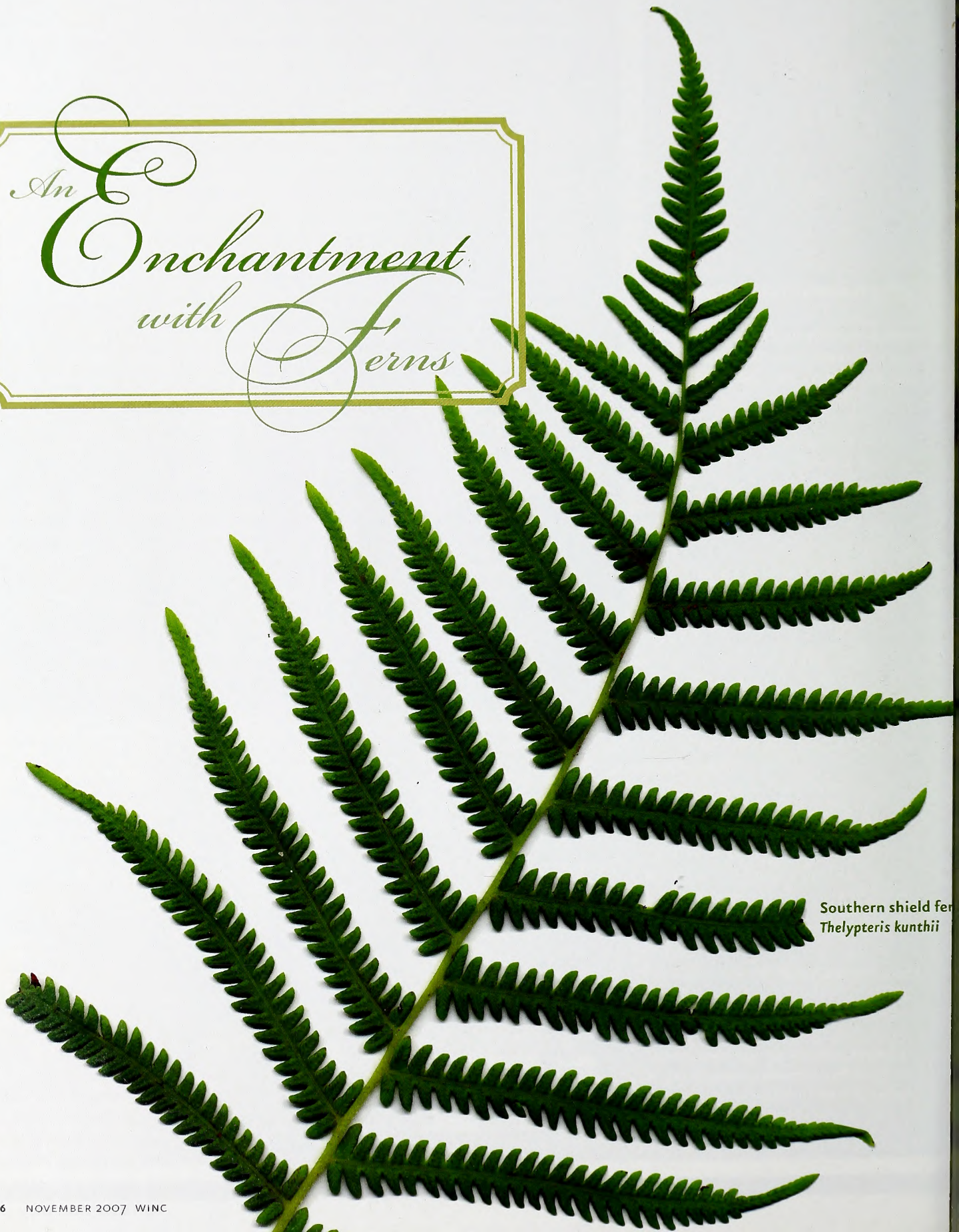
Each map is a storehouse of information about plant and wildlife distributions, sources of drinking water, where land is already being protected, and where working farms exist. Collectively, these maps provide a comprehensive look at the array of resources that need our protection. By layering these maps on top of one another using Geographic Information Systems technology, it becomes possible to see where natural resources are concentrated, where multiple resources can be protected with one project, and where resources may be at greatest risk. In addition, this tool focuses and prioritizes research needs and reveals areas where too little information is available.

The Strategic Conservation Plan is an endeavor to highlight areas of opportunity for collaborative conservation that will sustain the most significant natural areas across our state for years to come. Importantly, the data that underpins this plan will be updated every six months and additional map layers will be added to ensure that the most current information is being used to drive conservation decision-making processes. North Carolina is well on its way to knowing which million acres to choose.

To view a draft of the N.C. Strategic Conservation Plan, visit conservision-nc.net.

– Kim Douglass and Carol Price

An Enchantment with Ferns



Southern shield fe
Thelypteris kunthii

A LOCAL NATURALIST CHALLENGES HIMSELF TO SORT THROUGH AN ECOLOGICAL PUZZLE:

Why do ferns grow where they do?

To most of us, ferns symbolize the coolness of a sparkling stream bank or a shady glen. In lush forests ferns abound, telling us of the rich soil and a healthy woodland community. But forests are not the only places where ferns occur. They grow almost everywhere. Some species characterize acidic swamps, sunlit marshes, damp meadows, rock cliffs, roadside ditches and even waste areas. There is a wide spectrum of habitat adaptations, and each species of fern stands like a banner to proclaim specific ecological conditions. In some cases, subtle differences such as soil chemistry variations that are difficult to predict are quickly identified by indicator species such as ferns.

North Carolina, with a wide variety of geographical zones and biological communities, supports a wide assortment of ferns — 58 native and one introduced species are reported. Last year I decided to see how many of these I could find on just the small tract of land we own in Bladen County. This was not simply a drill at making a checklist of species, although that was part of it. I also wanted to see what combinations of ecological parameters provide the microclimates required by each fern.

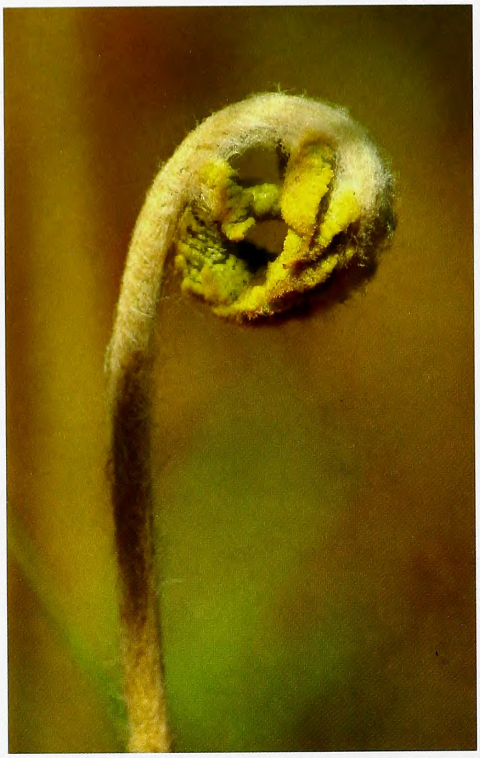
WRITTEN BY DAVID S. LEE

Resurrection fern
Pleopeltis polypodioides

MELISSA McGAW

Young curled-up fern fronds are often referred to as "fiddleheads." This is due to their shape, which resembles the scroll at the head of a fiddle.

NATE BACHELER



Bracken fern
Pteridium aquilinum

TED BODNER

My Arboretum

My wife and I have owned this property for several decades, and based on what I had seen, I expected that altogether I would document about a dozen species. I found nearly 20. Despite the diversity of ferns living in North Carolina, I knew that many types would not occur here. A number of ferns have very specific pH tolerances, and though those that thrive in the acidic soils here seem to be everywhere, the calcareous-soil species would be lacking. In addition to the difference in climate conditions between the Mountain region and the Coastal Plain, the key factor regulating the occurrence of many types of ferns on the outer Coastal Plain is the absence of calcareous soils. Limestone provides growing sites for many of the species seeking the opposite extreme of the pH scale. I did not need to concern myself with the identification of bulblet bladder ferns or walking ferns. Still, a great many ferns have a wide pH tolerance and as a result have broad distributions. These are the types that best transplant to gardens.

Walking the property, I could see a whole spectrum of soil moisture gradients. These terminated in a swamp forest where the ground was wet for so much of the year that the royal ferns needed to grow perched on stumps and cypress knees to get enough air to their root systems. Even minute differences in soil moisture or, more important, the amount of time in the year that the soils remained saturated were important. Seldom did I find more than one species growing alongside another. Soil fertility was also important. The bracken ferns thrived in sterile spots where even many grasses had trouble getting a foothold, and the marsh ferns were confined to areas that were often flooded. It was not the flooding that dictated where they would grow. Rather, the runoff nutrients that accumulated in the drying pools allowed them to thrive.

Some of the controlling elements were more challenging to identify, and only because I knew the history of the property could I see the pattern. The bracken fern grew on both open and forested areas but always on the somewhat drier sites. It thrived in areas that had been burned over by fast-moving winter ground fires. Summer fires favor grasses and herbaceous plants, and no burning results in sterile soils. Ash from the fires is important, as it releases nutrients and buffers the local acidic soil conditions. The bracken flourished where other plants failed.

One cannot get into fern identification without discovering the oak ferns, of the genus *Dryopteris*. The most recent counts indicate more than 1,200 species of oak ferns throughout the world. Fortunately for me and other novices in fern identification, North Carolina has only eight species. However, be on guard: There are also named varieties and hybrids. Several of these are quite rare, and most species are not found on the state's Coastal Plain. By teasing out the possibilities, I found that I had only two species to consider of this otherwise notoriously difficult complex of species. This saved me hours, because I did not need to spend time fretting over taxonomic keys and relearning botanical terms to make identifications. There were just two species, so each oak fern was either one or the other.

It is generally recognized that the oak ferns are very good indicators of soil moisture. Each species has slightly different moisture requirements, and because of this, each type tends to grow separately. Though most inhabit wet and moist woodlands, there are species of oak ferns to the north of our state that grow on dry cliffs. The only two species likely to be found on my site were the Southern shield fern, a plant of stream banks and swamps, and the log fern, a rare species restricted mostly to swamps in our part of the world. Sure enough, the shield ferns were the *Dryopteris* growing along the banks of the small headwater streams on our property, and after some sloshing around in the river swamp, I found a different-appearing oak fern. It was even growing on a fallen cypress. The glitch in all this is that both of these species are known to hybridize; in fact, some botanists consider the log fern itself to be a hybrid. Whatever their genetic makeup, the log ferns were restricted to the swamp.

Generally Speaking

Even though each plant was tied to specific habitat types, by fern standards the ones I was finding represented species that are wide-ranging generalists. Fern spores can be transported by wind for seemingly unbelievable distances, so distributions are not like those of frogs or maple trees. The point is that fern spores get about on an almost global scale. So where environmental conditions are suitable sooner or later appropriate species will become established—even at sites that from a zoogeographic perspective at first seem

far-fetched. This of course adds levels of confusion to the question of which species might occur naturally and which ones were first introduced as horticultural exotics.

Just to show how predictable ferns are, I will share this story. The late Elmer Worthley, a well-known botanist, good friend and my botany instructor of decades back, enjoyed telling about a long and rather dull geology field trip. The leader spent way too much time discussing a particular sandstone outcropping in western Maryland. Bored and looking to prompt the instructor toward what had to be the bottom line, Elmer said, "Must be quite a bit of calcareous mineral in there." The geology professor was amazed at Elmer's knowledge of this unusual type of sandstone. But the statement did not reflect knowledge of rocks and minerals. Rather, the purple cliff brake that grew in scattered pockets on the cliff face provided the answer. To a trained botanist such as Worthley, the presence of this fern was as good an indicator of calcareous minerals as a chemical test would be to a geologist. In North Carolina, this species is restricted to a few mountain sites — confined to similar types of sandstone outcrops as well as marble and amphibolite — and is considered endangered.

Our resurrection ferns are probably the strangest species. People generally are not familiar with epiphytic ferns, which grow on trees. Even when living beneath them, most people don't notice such plants. These ferns

Royal fern
Osmunda regalis

Fern spores can be transported by wind for seemingly unbelievable distances, so distributions are not like those of frogs or maple trees.

Christmas fern
Polystichum acrostichoides

TOM GOFORTH

Waterbirds and turtles moving from pond to pond transport the spores and even the plants themselves.

New York fern
Thelypteris noveboracensis

are small—8-inch fronds would represent large ones—and typically grow mixed with liverworts, various mosses and, of course, Spanish moss. They are evergreen ferns, but during periods of drought, their leaves curl up and the ferns appear to be dead. The scaly undersides of the fronds fold downward, protecting the shriveled, seemingly lifeless plant from dehydration. The scales also are arranged so they help channel rain and dew into the tissues of the fern, allowing it to absorb water faster. With a little rain, or sprinkling from a garden hose, the fronds unfurl and open, exposing their greener topsides. This behavior is responsible for their name.

Actually, they are a good gauge to judge how much rain a particular place has received in the previous weeks. Like other epiphytic plants, these ferns receive no nourishment from the host tree but instead gather water and nutrients from woody, horizontally creeping rhizomes. These rootlike structures are covered with pointed scales that help the plant take a grip on the tree's bark. Proof that the fern is not getting nourishment from a living thing is easily shown: These plants also grow on dead trees, stumps, logs, the roofs of wooden sheds and, in more northern portions of their range, rocks. On our property these ferns grow mostly on oaks and cypress deep within the river swamp, apparently requiring the higher levels of humidity found there.

And then there is the mosquito fern. Totally unfernlike in appearance, it is aquatic and floats on the surface of quiet freshwater ponds and sluggish sunlit creeks. These minute free-floating ferns are typically green, but in strong sunlight they turn a deep red. They are sometimes so abundant that they form mats on the water's surface with varying colors, indicating how many hours of direct sunlight a particular section of water receives. Some people believe that when the fern becomes dense over small bodies of water, the layered leaves form thin sheets that prevent the reproduction of mosquitoes, as the larvae can't breathe. Last summer, in addition to adding the fern to my list, I translocated some of it to a bucket. Although a nearby bucket of water without the fern had countless mosquito larvae of various sizes, the bucket holding the mosquito fern did not. This backyard science project suggested that there is truth in some folk yarns of old.

Waterbirds and turtles moving from pond to pond transport the spores and even the plants themselves. The stalks of the mosquito fern are brittle and break apart easily. The separated portions of the plant can start additional plants vegetatively. Under the right conditions these ferns spread quickly, sometimes even growing out of the water, working their way up stumps and the banks of ponds for several inches.

The mosquito ferns that I find prosper for several months or years and then die back as their pools dry up or the aquatic conditions change. Then, when they are all but forgotten, they suddenly reappear. I suspect combinations of cold winters, changing pH and shifting amounts of nitrates in the water are responsible for their disappearances and subsequent reappearances.

Sunlight, moisture, soil fertility and pH all unite in an endless variety of combinations to play major roles in influencing the distributions of our local ferns. One baffling example is the climbing fern. This is an evergreen fern that looks and behaves like a vine. The aboveground stalks are individual fronds that do not branch and fork, but the underground rhizome does branch and fork. An aboveground stalk can exceed 4 feet in length, and it climbs on other vegetation with slender twisting stems (rachises) that support its small, ivylike leaves (pinnae). The reproductive, spore-producing leaves grow at the upper ends of the stalks.

This species is found along the Atlantic coastal states from New Hampshire to Florida and west to Ohio, but its occurrence is very sporadic, and the colonies are widely scattered. North Carolina is no exception. It is known from a few sites in only 10 counties. One of these lies to the immediate north of Bladen County, and another is the adjacent county to the east. Yet in areas where it is found, this fern can be quite abundant. It

grows best in wet soils with moderate amounts of sun, but such habitats are much more common than the fern. I have been looking for climbing ferns on our property for years without success. We have appropriate habitats, and we are in geographic proximity to known populations. Why does this species have such a spotty distribution? Obviously there are unidentified factors that dictate where it can grow. The answer has plagued botanists for decades, and perhaps this fern's distribution will never be understood.

Longtime Neighbors

We know from the fossil record that ferns have been around since the Devonian period, but ones similar to our backyard species did not appear until after the great coal age about 320 million years ago. The higher elevations of the Appalachians in the Carolinas contain the oldest known fern species on earth, *Osmunda claytoniana*, the interrupted fern. Fossils that are morphologically identical to this fern have been recently found in 200-million-year-old sedimentary rocks in Antarctica.

Up through the Jurassic period, ferns and similar primitive plants were the dominant land vegetation, but the development of our modern-day ferns actually parallels the appearance and expansion of flowering plants. Flowering plants took over the landscape, and the ferns adapted to coexist with them. The ferns not only had to keep from competing with each other but also had to find ways to exist among the more successful flowering plants. There's actually more to it than that: The ferns not only live among the other plants but also use the microclimates provided by the dominant vegetation.

The geographical and ecological distributions of the ferns I was finding in Bladen County result from this complex and ongoing sharing of real estate. Yet, for the most part it is easy to see why certain ferns grow in certain places. Generally, each species grows where others can't. This is an elementary yet important ecological concept. By adapting to environmental conditions that are unfavorable for competing forms, each species is assured a place in the biotic community. It's a life that is hard-won.

Frequent contributor David S. Lee is director of the Tortoise Reserve, an international turtle conservation organization.

NATURE'S WAYS

How Do Ferns Reproduce Without Seeds?

See Nature's Ways, page 39.

Cinnamon fern
Osmunda cinnamomea

TOM GOFORTH

Northern maidenhair fern
Adiantum pedatum

BRUCE A. SORRIE

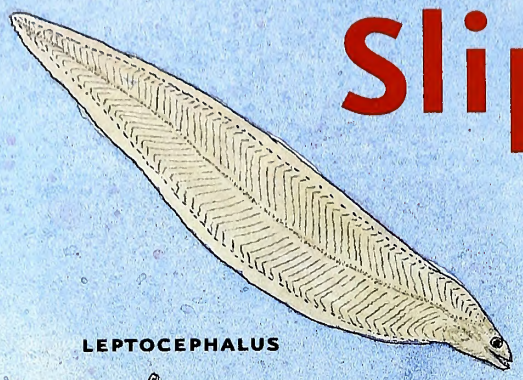
Royal fern
Osmunda regalis

BRADY BECK

Only one freshwater fish in North Carolina can live up to the expression

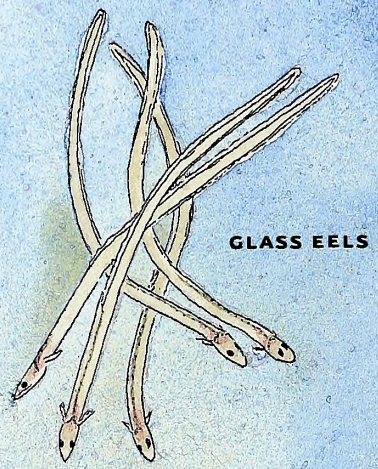
Slippery as an Eel

written by Jeff Beane / illustrations and nature activity by Anne M. Runyon



LEPTOCEPHALUS

Eels are a diverse group of slender-bodied bony fishes. They make up the order Anguilliformes, which includes about 20 families and several hundred species, ranging almost worldwide.



GLASS EELS

REAL EELS

Eels lack pelvic fins. Most have small, rounded pectoral fins, and their dorsal, caudal and anal fins usually join to form one long, continuous, soft-rayed fin. Their scales are either tiny and embedded in the skin, or lacking altogether.

Conger eels, snake eels, snipe eels and moray eels are among the many marine species occurring off North Carolina's coast. Some other long-bodied fishes are often incorrectly called eels. These include lampreys, hagfishes and the electric eel of South America (which is actually a knifefish).

AMERICA'S EEL

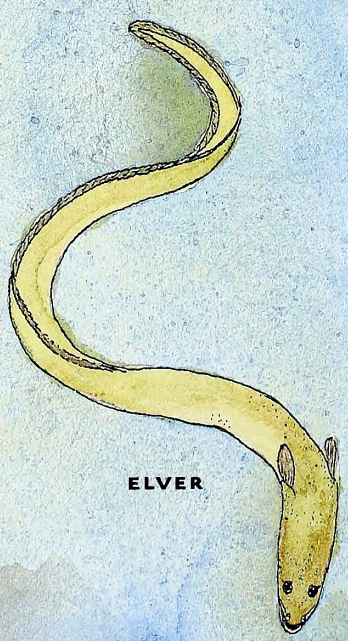
In North America, the best-known eel, and the only one normally inhabiting fresh water, is the American eel (*Anguilla rostrata*). Ranging from southern Greenland to northern Brazil, it occurs over much of the eastern U.S., perhaps utilizing the widest range of habitats of any fish.

Eels eat mostly insects, worms, mollusks, crustaceans and small fishes. They also scavenge. Equipped with relatively weak jaws and small teeth, they have an unusual technique for handling food items too large to swallow whole; they grab a mouthful and spin, crocodile-style, to tear off manageable chunks. Eels can spin up to 14 times per second,well over twice as fast as pirouetting Olympic figure skaters.

Many animals prey on eels. At least one species, the rainbow snake, specializes in eating them.

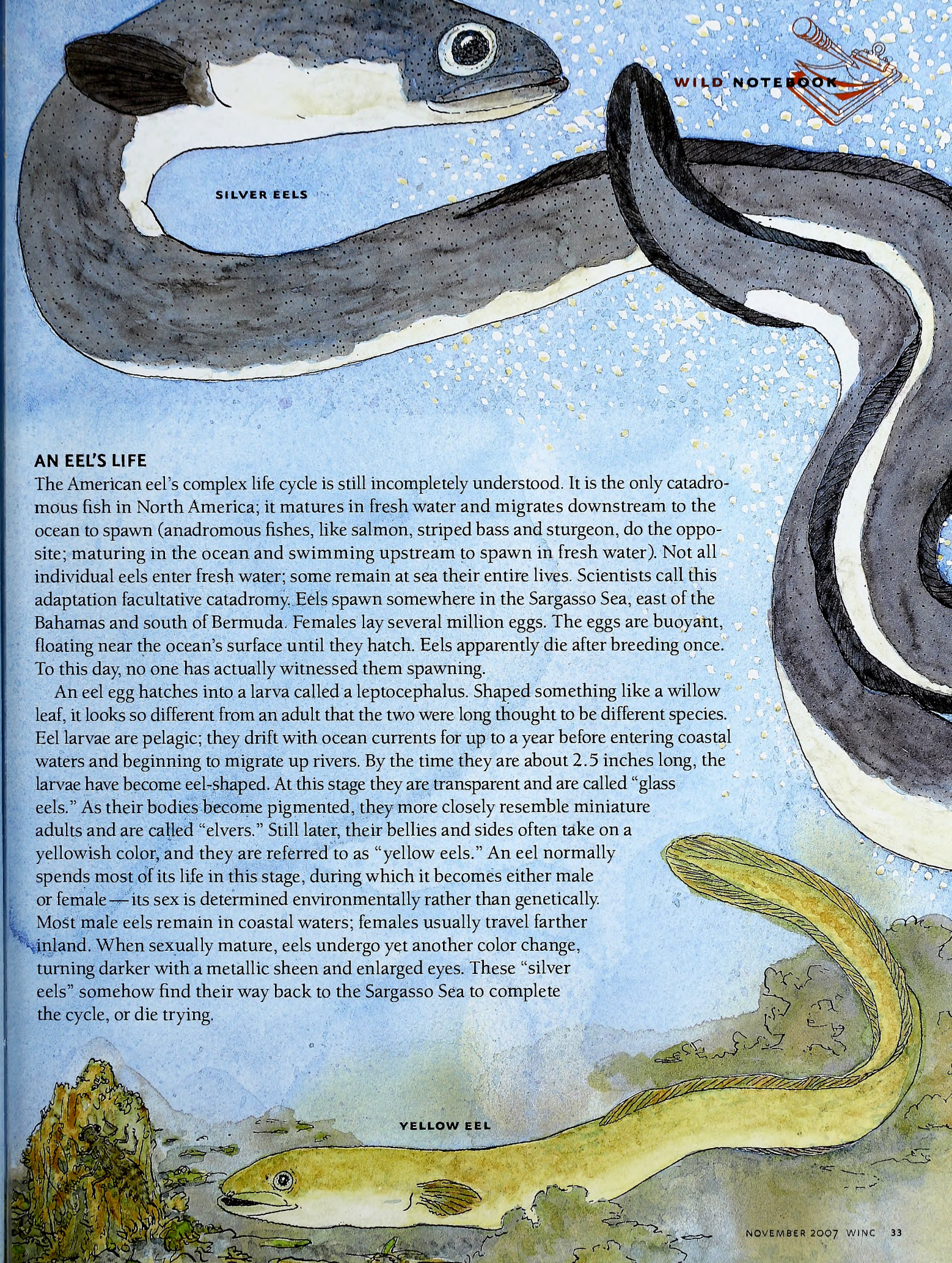
Eels can absorb oxygen through their skin as well as their gills, and may occasionally travel overland for short distances. They are sometimes found in land-locked ponds and lakes.

American eels usually require five years or more to mature. Some may live for 20 years or more, and at least one captive survived for over 80. Males seldom reach 2 feet in length, but the largest females can exceed 5 feet and weigh well over 10 pounds.



ELVER

Rainbow snakes specialize in eating eels.



AN EEL'S LIFE

The American eel's complex life cycle is still incompletely understood. It is the only catadromous fish in North America; it matures in fresh water and migrates downstream to the ocean to spawn (anadromous fishes, like salmon, striped bass and sturgeon, do the opposite; maturing in the ocean and swimming upstream to spawn in fresh water). Not all individual eels enter fresh water; some remain at sea their entire lives. Scientists call this adaptation facultative catadromy. Eels spawn somewhere in the Sargasso Sea, east of the Bahamas and south of Bermuda. Females lay several million eggs. The eggs are buoyant, floating near the ocean's surface until they hatch. Eels apparently die after breeding once. To this day, no one has actually witnessed them spawning.

An eel egg hatches into a larva called a leptocephalus. Shaped something like a willow leaf, it looks so different from an adult that the two were long thought to be different species. Eel larvae are pelagic; they drift with ocean currents for up to a year before entering coastal waters and beginning to migrate up rivers. By the time they are about 2.5 inches long, the larvae have become eel-shaped. At this stage they are transparent and are called "glass eels." As their bodies become pigmented, they more closely resemble miniature adults and are called "elvers." Still later, their bellies and sides often take on a yellowish color, and they are referred to as "yellow eels." An eel normally spends most of its life in this stage, during which it becomes either male or female—its sex is determined environmentally rather than genetically. Most male eels remain in coastal waters; females usually travel farther inland. When sexually mature, eels undergo yet another color change, turning darker with a metallic sheen and enlarged eyes. These "silver eels" somehow find their way back to the Sargasso Sea to complete the cycle, or die trying.

UNREAL EELS

Eels are popular subjects in myths and folklore, where they are often credited with magical properties. In parts of Micronesia, they are believed to harbor the spirits of dead human ancestors, and killing one is regarded as extremely bad luck. In parts of the U.S., eels were once believed to be female bullhead catfish, or otherwise able to interbreed with catfish. Aristotle believed eels arose spontaneously from mud, and even Linnaeus thought they were livebearers. Some cryptozoologists (scientists who study animals of questionable existence) believe the Loch Ness Monster could be a species of giant eel.

silver eels spawning

Get Outside

You're most likely to see an eel if you live in the eastern half of North Carolina, but even in the western Piedmont or foothills you might occasionally encounter one in a river, reservoir or pond. Eels of various life stages are especially common in tidal creeks, marshes, canals and other coastal waters. Secretive by day, they are perhaps best observed in waterways at night with a flashlight. For a close look, elvers may be caught in dipnets or seines, and adults may be trapped or caught on hook and line. If you've ever tried to handle a live eel, you'll quickly notice how its thick mucous coating and muscular body redefine the concept of slippery. American eels are escape artists with strong tendencies to burrow and hide; they therefore make poor exhibit animals and are seldom displayed in public aquariums.

Eels deserve respect and appreciation. Next time you see one, think about its remarkable life cycle and exceptional adaptability.

EEL APPEAL

Though not often eaten in this country, eels are excellent food fish. They are taken by many different methods in a large commercial fishery. Along North Carolina's coast they are most often caught in baited mesh funnel traps called eel pots. Most commercial catch is exported to Europe and East Asia, where eels are prized as food. They are eaten smoked, fried, pickled, jellied or stewed.

As is the case with many other fish species, commercial catches of eel have declined sharply in recent years. Threats include over-fishing, hydroelectric dam turbines, water pollution, habitat loss and introduced predators and parasites. Despite their resilience and high reproductive capacity, eels are living testimony to the fact that no resource is inexhaustible. The U.S. Fish and Wildlife Service recently reviewed the American eel's status, and the Atlantic States Marine Fisheries Commission is currently developing a fisheries management plan to conserve this unique and valuable fish.

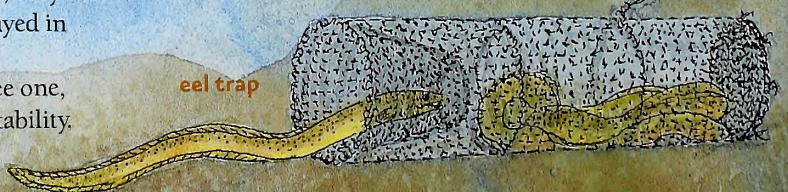
Read and Find Out

- "The Eel, 5th edition" by Friedrich-Wilhelm Tesch, Blackwell Science Ltd, 2003.
- "Eels: A Natural and Unnatural History" by Christopher Moriarty, Universe Books, 1978.
- "A Field Guide to Atlantic Coast Fishes of North America" by C. Richard Robins, G. Carleton Ray, John Douglass, and Rudolf Freund, Houghton Mifflin, 1986.
- "Freshwater Fishes of the Carolinas, Virginia, Maryland, and Delaware" by Fred C. Rohde et al., University of North Carolina Press, 1994.

In *Wildlife in North Carolina:*

- "The Many Lives of Eels" by Lawrence S. Earley, February 1982.
- "Eel Excursions" by David Lee, March 1987.

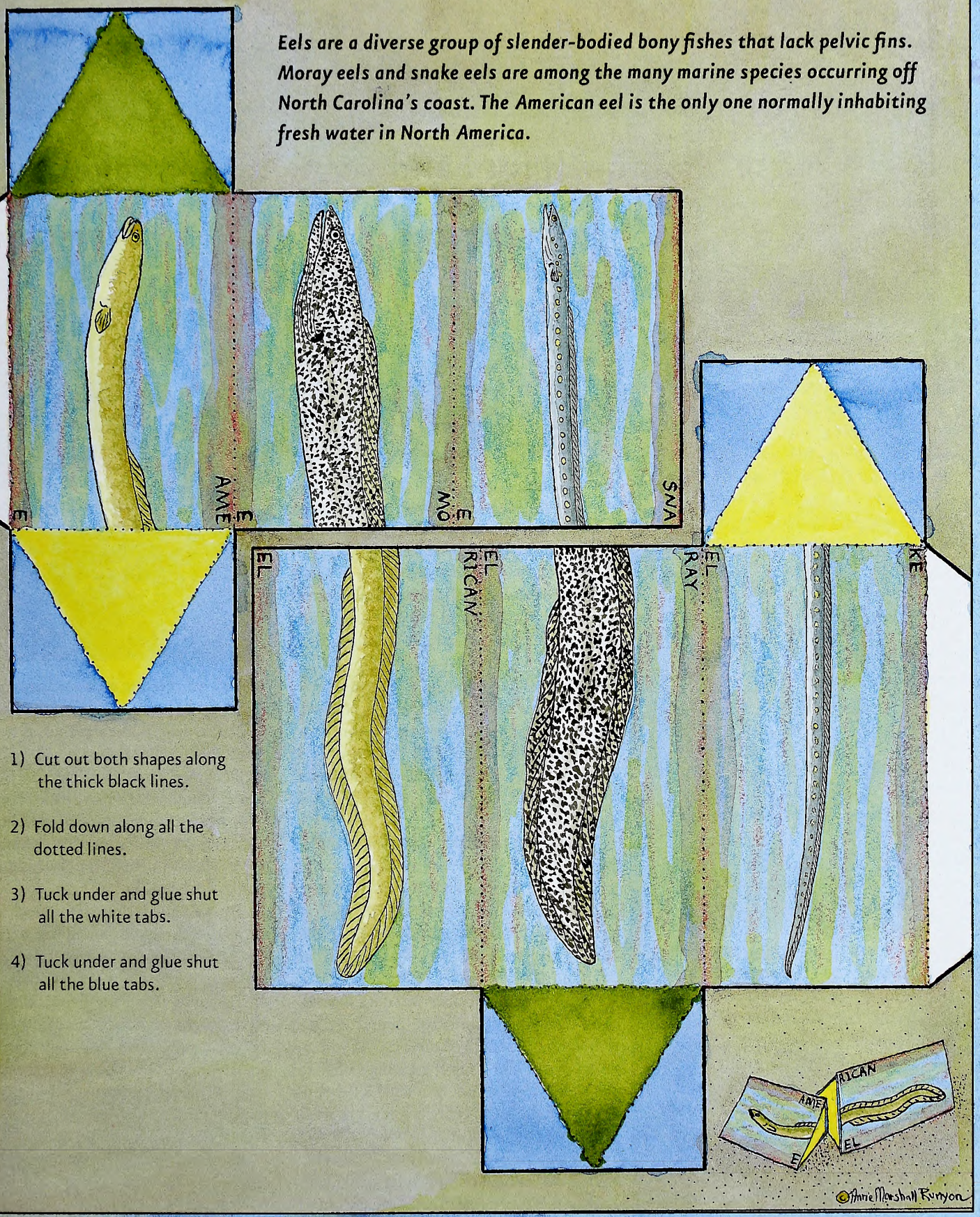
Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.



eel trap

Make The Three-Eel Turn Toy

Eels are a diverse group of slender-bodied bony fishes that lack pelvic fins. Moray eels and snake eels are among the many marine species occurring off North Carolina's coast. The American eel is the only one normally inhabiting fresh water in North America.



1) Cut out both shapes along the thick black lines.

2) Fold down along all the dotted lines.

3) Tuck under and glue shut all the white tabs.

4) Tuck under and glue shut all the blue tabs.

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

August Big Month for Landing Record-Breakers

The temperature wasn't the only thing that broke North Carolina records in August—fishing was equally as hot. Anglers broke five state records for three different species.

The action was particularly torrid for kokanee salmon, as two anglers caught three record-breaking fish from Nantahala Lake. On Aug. 3, Mark Swann of Black Mountain reeled in a 2.48-pound kokanee salmon to top the previous record set last year. The next day, 9-year-old Levi Towery of Forest City brought in a salmon from Nantahala that topped Swann's by a mere 2/10ths of a pound. Later in the month, on Aug. 27, Swann broke the record again, this time with a 3.07-pound salmon that measured 19 ½ inches in length.

Swann's latest catch might be hard to beat. According to Doug Besler, the fisheries biologist who certified this latest state record, some kokanee salmon in Nantahala Lake may get as big as 5 pounds during the spawning run. Swann's fish is a nice size, particularly for the nutrient-poor reservoirs common in the western part of the state.

Nantahala Lake is the only spot in North Carolina where kokanee salmon are found. The fish, which is native to the western United States, was stocked in Nantahala Lake in the mid-1960s by the N.C. Wildlife Resources Commission in an attempt to establish the species as a forage fish for other predator fishes in the lake. This stock has remained and became a favorite target for anglers like Swann.

Two more records tumbled on Aug. 15, one for white crappie and the other for channel catfish.

Eddie Braswell of Granite Falls reeled in the record-setting white crappie, which weighed 1 pound, 8 ounces and measured 14 inches in length, while fishing at High Rock Lake.

Braswell, a former Wildlife Commission employee who retired in 2004, fishes for crappie approximately 70 days a year, and starting in March or April, he tries to fish at least twice a week. While he fishes lakes Rhodhiss, Hickory and Norman from time to time, he favors the crappie fishing in High Rock Lake.

NCWRC

Mark Swann (clockwise from left), Wesley Trucks and Eddie Braswell landed record-setting kokanee salmon, channel catfish and white crappie, respectively.

In May, the Commission created a new white crappie state record category after separating the general crappie state record into white and black crappie. The existing crappie record, which was set in 1980, was a 4-pound, 15-ounce black crappie caught from Asheboro City Lake No. 4.

Although it remained unbroken for almost two years since the commission decertified it in 2005, the channel catfish state record has been broken for the second time this year—this time by Wesley Trucks of New Bern, who caught an 18-pound, 5 ounce channel cat from the Neuse River.

Trucks caught his fish on a cut eel using deep-sea gear, including 100-pound test line, in hopes of hooking a sizeable cat. "If you use smaller gear, you'll never get a big catfish to the boat," Trucks said. "But with 100-pound line, the fish has no chance—if it's hooked, it's coming on the boat."

An experienced catfish angler, Trucks knows that patience and fishing go hand-in-hand. And this night was no exception. "Nothing had bitten all night, and then, when I was getting ready to leave, the fish hit the line."

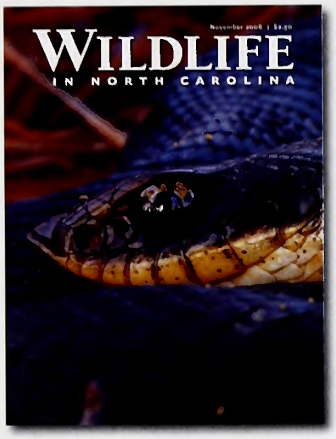
Trucks said he knew as soon as he saw th fish's anal fin that he had hooked a channe cat. Channel catfish have an anal fin that i round with 24 to 29 rays while blue catfis have an anal fin that has a straight outer edg and 30 to 36 rays. Shortly after reeling in th record-breaking fish, Trucks caught a 35 pound blue catfish.

Trucks' catch surpassed the previous reco by more than 2 pounds. John Davinson, Clayton, caught a 16-pound channel cat fro the Roanoke River on April 10.

To qualify for a state record, anglers mu have caught their fish on a hook and line must have their fish weighed on a certifie scale witnessed by one observer, have the fi positively identified by a qualified expert fr the commission and submit an applicatio with a full, side-view photo of the fish.

For a list of all freshwater fish state recor in North Carolina or for more information fishing in North Carolina's public, inlan waters, visit www.ncwildlife.org.

WINC Named Nation's Best



Wildlife in North Carolina has been named the top state wildlife magazine in the nation. The distinction came from the Association for Conservation Information, a nonprofit peer group for natural resource, environmental and wildlife communicators, at its annual conference in July. A panel of judges determined that *WINC* was the best of those magazines published by state wildlife agencies in 2006.

"It's hard to go wrong when you cover a state with the diversity of natural resources and as many opportunities for nature lovers and sportsmen that North Carolina has," said Greg Jenkins, editor of *Wildlife in North Carolina*. "Our talented staff and many excellent contributors work hard to accurately portray the beauty and variety of our state's wild animals and wild places. We're proud to receive this award."

Judges loved the look of the magazine. Here are samples of some of their comments: "This publication is designed very well." "Great use of combining photo and illustration to create a more impactful design." "Very nice use of typography."

WINC has ranked among the top three wildlife magazines for five of the past six years, including winning three second-place awards. The magazine previously won first place in the competition in 1956, 1992, 1995 and 1997. *Montana Outdoors*, which won the competition in 2004 and 2005, placed second this year, while *Minnesota Conservation Volunteer* was third.

Wildlife in North Carolina makes an excellent, affordable gift. Subscriptions are $12 for one year, $30 for three years and $150 for lifetime. To subscribe, visit www.ncwildlife.org or call toll-free at 1-866-945-3746.

ON PATROL

Officer Chad Arnold was patrolling Plant Allen Hot Hole where he saw a man walking up from the water. Arnold stopped to ask if he had any luck fishing, noticing that the rod the man carried had a white bucktail that was still wet. The subject said no and kept walking. Arnold asked the man to stop, but he continued walking, then turned and screamed, "What?"

Arnold asked to see the man's fishing license. The man said, "I don't have to show them to you; you are just a ranger." Arnold then identified himself as a Wildlife Officer to which the man stated, "I don't care."

ILLUSTRATION BY JACKIE PITTMAN

The man began looking all around and acting excitedly. Arnold explained that not showing his license was a violation. The man stated again, "I don't care."

When Arnold told the man to turn around, he jerked away and started to dig his right hand into his back pocket. After a short struggle the man was on the ground and in handcuffs. Arnold later found that the man was going for his wallet to pull out his fishing license, which didn't expire for another six months. The man then said, "To answer your question, no, I didn't have any luck; the fish aren't biting today." Arnold asked why he had struggled and the man said he was just having a bad day. He was charged with resisting, obstructing and delaying an officer, and failure to allow inspection.

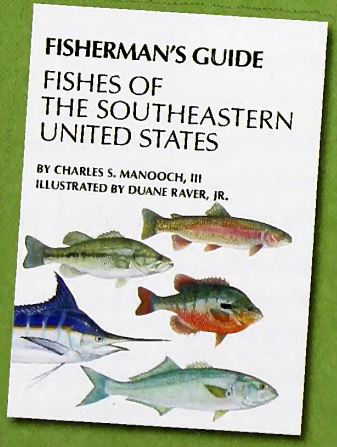
Classic Fish Reference Reissued

Written by Charles Manooch III and illustrated by Duane Raver, "Fisherman's Guide to the Fishes of the Southeastern United States" has become one of the classic reference books for anglers in the Southeast and Mid-Atlantic. Now, the 1984 volume, first published by the N.C. Museum of Natural History, is being reprinted and will be available this fall.

The book, which quickly became indispensable for freshwater and saltwater anglers and commercial fishermen from Delaware through Florida, is impressive both for its breadth of coverage and clarity of prose. It includes more than 250 species of fish and an artist's beautiful color paintings of 150 of those most frequently caught. Detailed accounts tell the reader how to identify the fish, provide life history, habitat and distribution information, and methods of catching and preparing the fish for the table.

Manooch is a fisheries biologist and Raver is an artist, illustrator and fisheries biologist. Raver also was the longtime editor of *Wildlife in North Carolina*.

The book is being released by the Raver-Manooch Partnership. Initially, it will be available in Raleigh at Quail Ridge Books and Music and at the N.C. Museum of Natural Science; in Morehead City at Dee Gee's; in Beaufort at the Maritime Museum; in Kinston at the Neuse Sport Shop; and at all three N.C. Aquariums. They may also be obtained by writing or calling Raver-Manooch, 2900 Dogwood Lane, Morehead City, NC 28557 (252-726-4711) or 50 Beech Trail, Garner, NC 27529 (919-550-9873). The book retails for $39.95.



Do You Know a Conservation Hero?

The N.C. Wildlife Federation is seeking nominations for the 2007 Governor's Conservation Achievement Awards, the state's most prestigious conservation honor. Do you know of a schoolteacher who inspires kids with a love of wildlife? A volunteer whose commitment to clean water or land conservation inspires others? A scientist or landowner who has made significant contributions to wildlife conservation?

Conservation heroes range from Rachel Carson (above) to your next-door neighbor.

Awards are made in more than 15 categories, including Land Conservationist, Water Conservationist, Wildlife Conservationist, Legislator, Environmental Educator, Youth Conservationist, Business Conservationist and Conservationist of the Year awards. And there are others. "By recognizing, publicizing and honoring these conservation leaders—young and old, professional and volunteer—the North Carolina Wildlife Federation hopes to inspire everyone to take a more active role in protecting the natural resources of our state," said T. Edward Nickens, chairman of the Governor's Conservation Achievement Awards Program.

The deadline for nominations is Dec. 14. For more information, contact the N.C. Wildlife Federation at (919) 833-1923. To download a nomination form, go to www.ncwf.org. Awards are presented at a gala event in February, where recipients are presented a certificate and a statuette.

IN SEASON

This month, these seasons are open in North Carolina:

Bear: See Regulations Digest for seasons and locations.

Bobcat: Through Feb. 29.

Common Snipe: Nov. 14–Feb. 28.

Crow: Wednesday, Friday and Saturday of each week between June 1, 2007, and Feb. 29, 2008, plus Thanksgiving and Christmas.

Fox: Nov. 17–Jan. 1.

Grouse: Through Feb. 29.

Mourning Dove: Nov. 19–24.

Pheasant: Nov. 17–Feb. 1.

Rails, Gallinule and Moorhen: Through Nov. 9.

Rabbit: Nov. 17–Feb. 29

Raccoon and Opossum: Through Feb. 29.

Quail: Nov. 17–Feb. 29.

Squirrel: Gray and red through Jan. 31; fox through Dec. 31 in selected counties.

White-tailed Deer: Eastern: gun season through Jan. 1. Central: bow season through Nov. 2; muzzleloading season Nov. 3–9; gun season Nov. 10–Jan. 1. Northwestern: bow season through Nov. 9, muzzleloading season Nov. 10–16, gun season Nov. 17–Dec. 15. Western: bow season Nov. 17; gun season Nov. 19–Dec. 8.

Wild Boar: Through Nov. 17 in Cherokee, Clay, Graham, Jackson, Macon and Swain counties. (In the other 94 counties, feral hogs are not considered to be wild boars, and the commission does not regulate them.)

Migratory Waterfowl

Canada Goose: Resident Population season Nov. 10–Dec. 1; Southern James Bay Population Nov. 10–Dec. 31.

Snow, Blue and Ross' Geese: Nov. 10–March 1.

Brant: Nov. 17–Dec. 1.

Tundra Swan: Nov. 3–Jan. 31 by permit only.

Ducks, Coots and Mergansers: Nov. 10–Dec. 1 (Black and mottled duck seasons closed until Dec. 1; harlequin duck season closed).

Sea Ducks: Through Jan. 31.

Check the *2007–2008 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

CALENDAR OF EVENTS

Tuesday–Sunday, November 6–11

Discover the diverse habitats and wildlife of the Outer Banks at Wings Over Water in Kill Devil Hills. Participants may bird and paddle the marshes and coast, listen for red wolves and watch for bear in pocosin forests and open fields. Visit www.wingsoverwater.org.

Saturday–Sunday, November 10–11

Enter your flushing or pointing dog in the Dixie Duel, an upland bird dog competition in Harmony sanctioned by the Tournament Hunter/Bird Dog Challenge. Contact Matt Behe at (919) 818-1092.

Saturday–Sunday, December 1–2

Check out the 20th Annual Core Sound Decoy Festival at the Harkers Island Elementary School. Activities include carving competition, children's decoy painting, retriever demonstration, decoy auction, head carving contest and the world loon calling competition. Over 90 exhibitors will be displaying and selling decoys and waterfowl artifacts. Waterfowl Weekend at the Core Sound Waterfowl Museum runs concurrently with the Decoy Festival. Visit www.decoyguild.com and www.coresound.com.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check oppropriate black)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant. $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth. $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check oppropriote block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Sportsman, plus coastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ Lifetime Magazine Subscription to *Wildlife in North Carolina*. $150
(Please allow up to 6 weeks for your subscriptian to begin.)

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

MLIFE7

Make checks payable to: *Wildlife Endowment Fund*

A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

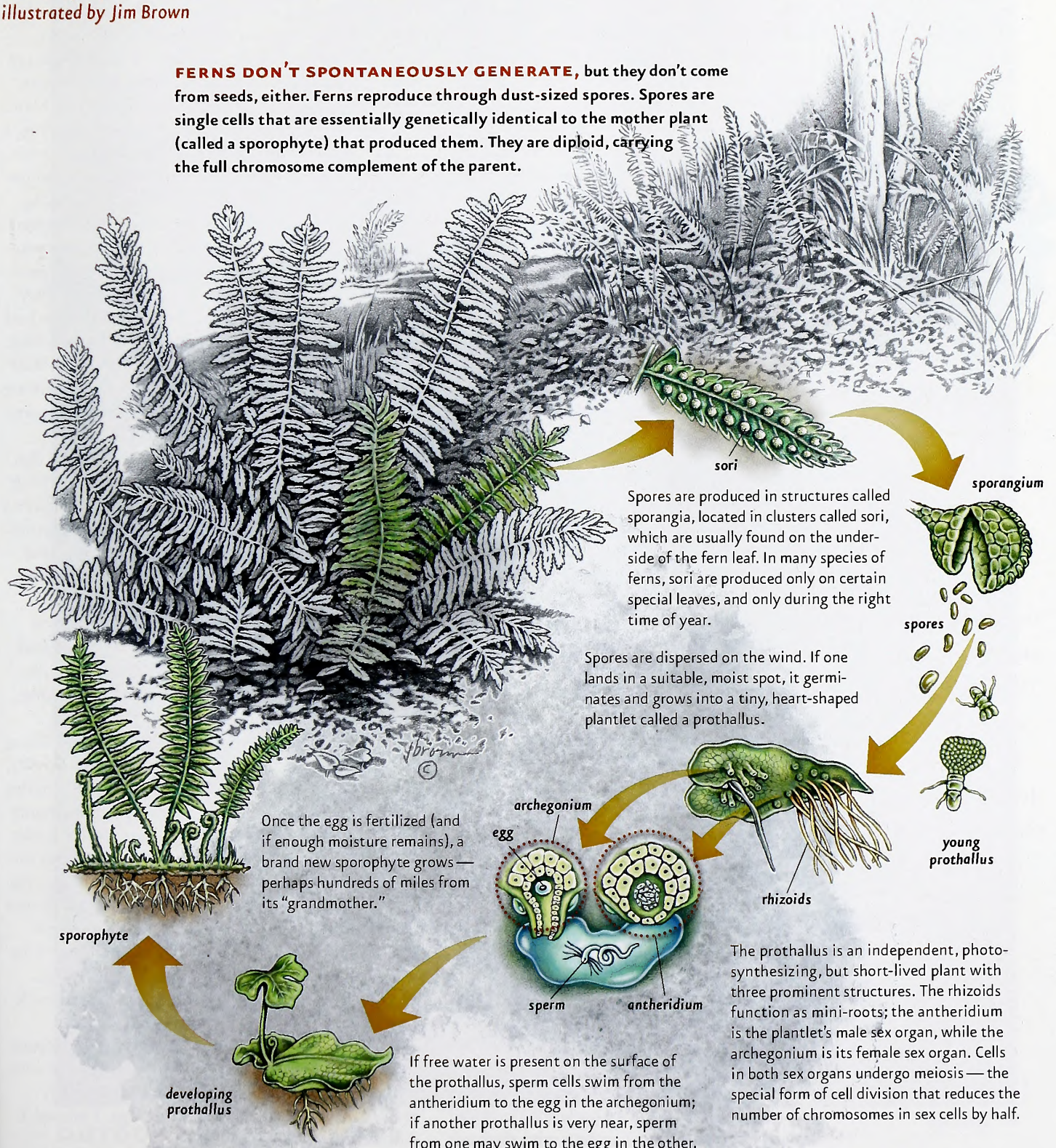
Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

How Do Ferns Reproduce Without Seeds?

written by Clyde Sorenson
illustrated by Jim Brown

FERNS DON'T SPONTANEOUSLY GENERATE, but they don't come from seeds, either. Ferns reproduce through dust-sized spores. Spores are single cells that are essentially genetically identical to the mother plant (called a sporophyte) that produced them. They are diploid, carrying the full chromosome complement of the parent.



On the Bunny Trail

written by Jim Dean

I saw the rabbit the other day. I use the singular form because I'm prepared to believe that this may be the only rabbit left on our family farm in Granville County. And a puny, scrofulous, flea-bitten, bad-hair (hare?) specimen it is, too. Were I a hungry hawk, I might think twice about touching that critter with my talons. That could explain this bunny's survival, except that hawks and other predators are hardly that fastidious. Nor is it probable that this is our only member of the *Leporidae* family. It takes at least two rabbits to generate a third, and their reputation for expansive procreation is legendary. It can't be for lack of trying.

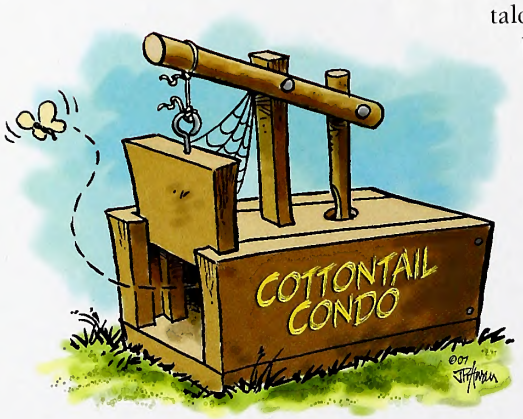


ILLUSTRATION BY JACKIE PITTMAN

Why there aren't more cottontails here and on similar habitat throughout the Southeast is an enduring mystery. When I was a kid, I remember walking through countless fallow fields laced with rabbit trails in eastern North Carolina. There were so many rabbits on our farm that every family set out a string of rabbit gums (homemade boxes with a trap door and a baited trigger). Tending the traps usually fell to a youngster who also collected and skinned the rabbits for the table. Yet, the rabbit population prospered despite trapping and hunting.

"I have this distant memory of a crisp Thanksgiving Day when we hunted through peanut fields and around abandoned houses overgrown with dense thickets."

In addition to the Eastern cottontail, we also occasionally jumped the smaller and darker bluetails or marsh rabbits in hardwood bottomlands. Marsh rabbits are still fairly common in the Coastal Plains and on the Outer Banks, but their preferred habitat doesn't extend far into the Piedmont. (There was, however, a huntable population under what is now Jordan Lake).

Biologists have studied the decline in cottontails (and bobwhite quail) for many years, but the causes remain elusive. An accelerating loss of habitat has long been considered the main culprit—made worse because prime areas are increasingly becoming islands isolated in a sea of development with no connecting corridors to other tenable habitat. But rabbit and quail populations have plummeted throughout the Southeast even in places that seem to offer good food and cover.

An experiment conducted some years ago by N.C. Wildlife Resources Commission biologists at Pennys Bend did little to clear the air. Ample food and cover was provided and, for awhile, the rabbit population exploded. Then, the rabbits disappeared. Certainly more predators were attracted to this food source—like kids at a pajama party finding the chocolate chip cookie jar—but other unknown influences are also suspected.

Another poorly understood factor is the impact of toxie chemicals. Surprisingly few studies have been conducted, and their findings have been mixed. Many biologists believe that increased predation is playing a major role. Prevailing ethics and laws today provide full protection to hawks and owls whose populations have soared, and these avian predators love young rabbits and quail when they're available. Furthermore, fewer people nowadays hunt foxes, skunks, raccoons and other similar species known to impact small game.

When rabbits were introduced in Australia, they had no natural predators and did what rabbits do best until their numbers nearly overran the continent. Alas, seldom is a population issue so easily pinpointed. Wildlife biologists concede that small-game losses here are likely the result of multiple influences, including some they admit they don't fully understand.

To the layman, it seems particularly illogical that populations of deer and turkeys are booming in both urban and rural environments while small-game species have been unable to adapt even where their opportunities appear most optimistic. A further irony is that rabbits have adapted to urban life and are prospering in many inner cities amid numerous predators.

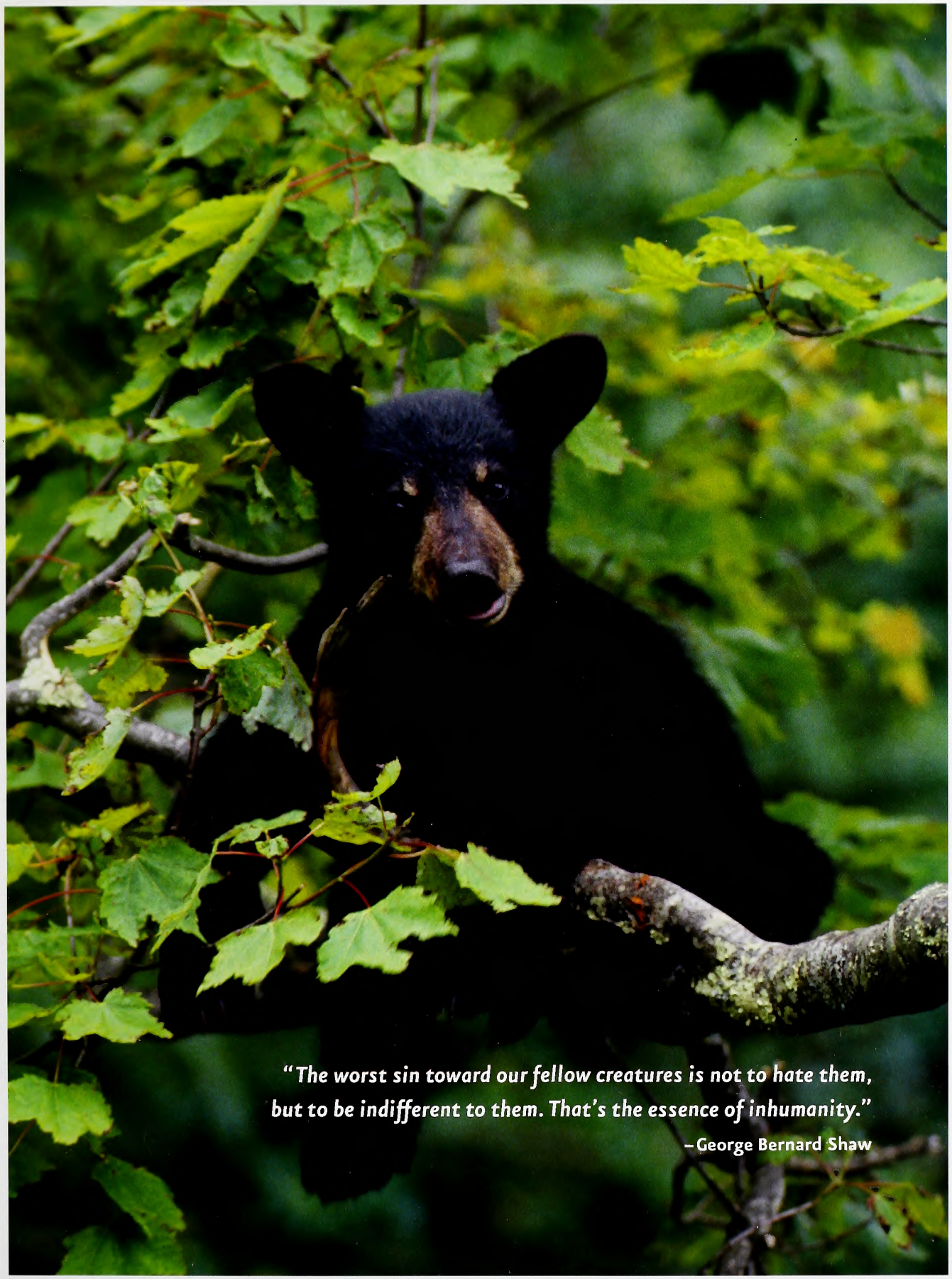
But nothing in nature is illogical—the logic is simply not always clear to us. Meanwhile, frustrated biologists look for answers while fighting multiple fires with a hose that's always too short—knowing that soon it may also be too late.

But, oh, what we once had. In the 1940s and '50s at my grandparent's rural home in Northampton County, I was privileged to hunt rabbits with my uncle Charles Brown and Ed Lassiter, who tended the steam-engine boilers at the basket mill. Ed's Ol' Blue was the leader of a pack of champion dogs with plenty of rabbits to run.

I have this distant memory of a crisp Thanksgiving Day when we hunted through peanut fields and around abandoned houses overgrown with dense thickets. Ol' Blue quickly jumped a rabbit, and Charles gave me a shell for the single-shot .410 that I was carrying.

"Just wait, Cap'n," advised Ed. "He'll circle back in few minutes, so you be ready."

Suddenly, a rabbit was bouncing towards me through the peanut stacks. While Ed and Charles howled with laughter, my target made a tight loop completely around me as I tried to get off a safe shot. I missed. I still miss it.



BILL LEA

Black bear cub

OUTDOOR MOMENT

IN THE DECEMBER ISSUE

TODD PUSSER

BEARS IN THERE
Pocosin Lakes National Wildlife Refuge hosts a rich diversity of wildlife, including black bears and flocks of wintering waterfowl.

FOOL-HEN OR FRIEND?
What makes the ruffed grouse, commonly an especially wary game bird, sometimes act tame and approach humans?

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For two decades, the N.C. Natural Heritage Trust Fund has enabled conservation groups to protect irreplaceable habitat.

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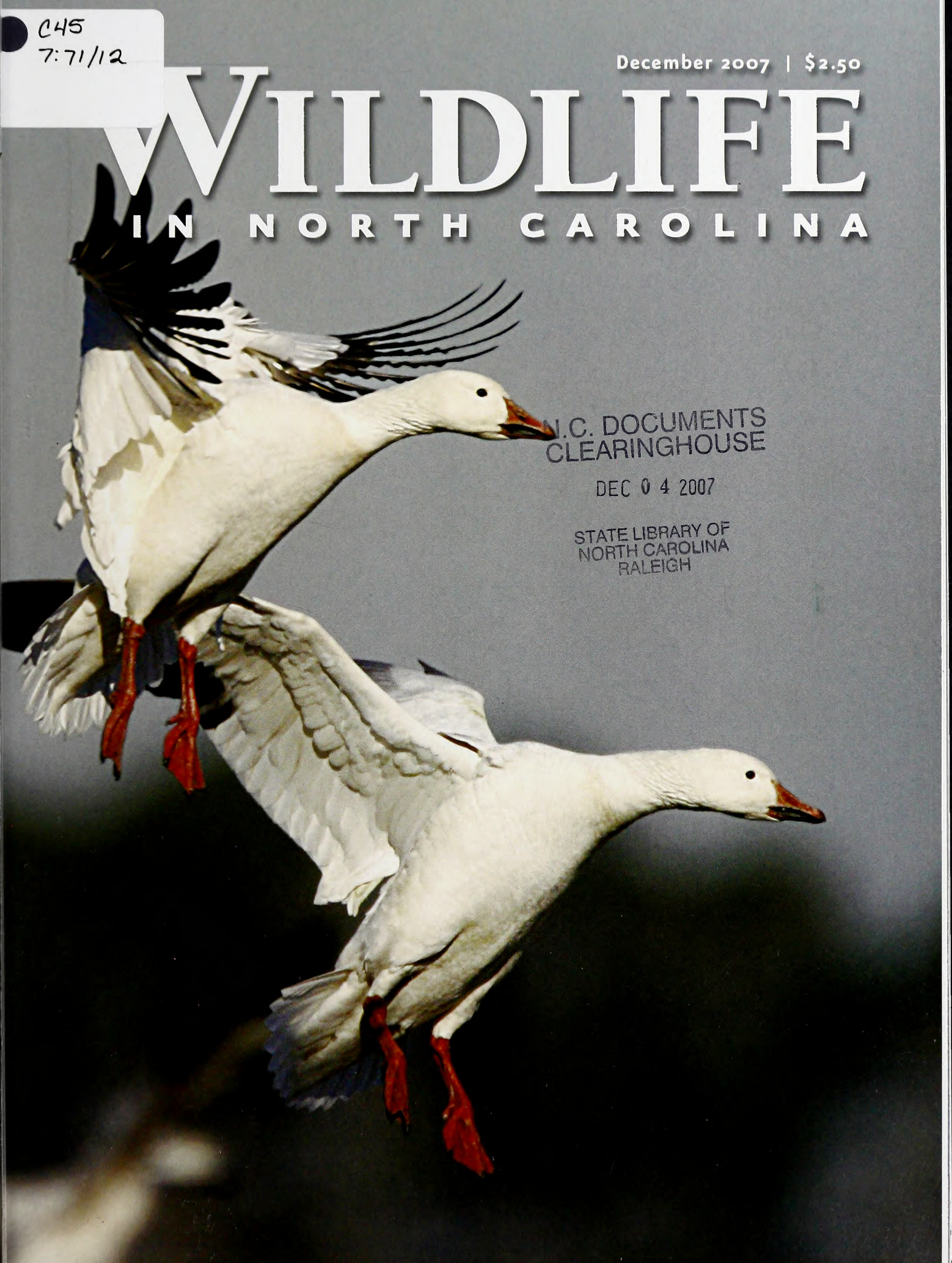

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For two decades, the N.C. Natural Heritage Trust Fund has financed the preservation of wild places in the Mountains and across the state.
PHOTOGRAPH BY KEN TAYLOR / NCWRC.

Volume 71 | Number 12

WILDLIFE IN NORTH CAROLINA

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Cover: Two of the tens of thousands of snow geese wintering at Pocosin Lakes National Wildlife Refuge come in for a landing. PHOTOGRAPH BY TODD PUSSER.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

December is the month in which we here at *WINC* like to spin a good yarn or two. So we present to you Gary Trawick's story about an old man and his old dog ("Patches' Last Hunt," page 28). If you have ever owned, hunted with or trained a bird dog, especially a Brittany spaniel, this story might strike a chord deep in your being. Others with only a passing knowledge of dogs should find it to be an interesting look at the relationship between a dog owner and man's best friend.

RUSSELL WYATT

Eric G. Bolen tells a fascinating tale about the history of the federal duck stamp program in "Ducks, Dust, Depression and Ding" (page 22), going back to the era of "The Grapes of Wrath" to explain the amazing vision and subsequent success of those who started the program. More than 5 million acres of waterfowl habitat have been preserved with the proceeds from stamp sales.

Thousands of acres of that habitat lie within the borders of North Carolina, but it took the formation of the N.C. Natural Heritage Trust Fund 20 years ago to help protect other types of wild places. "Building Trust" (page 10) by managing editor Michael O. Humphries illustrates how effective state agencies and trusts can be when they work together in the ways Natural Heritage and the N.C. Wildlife Resources Commission have. Of the quarter million acres the trust fund has helped save, 100,000 of them are managed by the Wildlife Commission.

Associate editor Jim Wilson shares the humorous and odd story of "The Grouse Whisperer" (page 4), a fellow named Russell Wyatt who has cultivated a relationship of sorts with a ruffed grouse in the North Carolina mountains. The bird appears to be as tame as a parakeet, often hopping on the man's boot or even his hat. Natural history writers over the years have documented similar behavior from the usually wary bird, but no one has fully explained why grouse sometimes behave that way. While the photos alone—especially the self-portraits of man and bird taken by Wyatt with a remote camera—make a look at the piece worthwhile, be sure to read Jim's story, too. We don't want you to miss out on a good tale.

Greg Jenkins

Greg Jenkins

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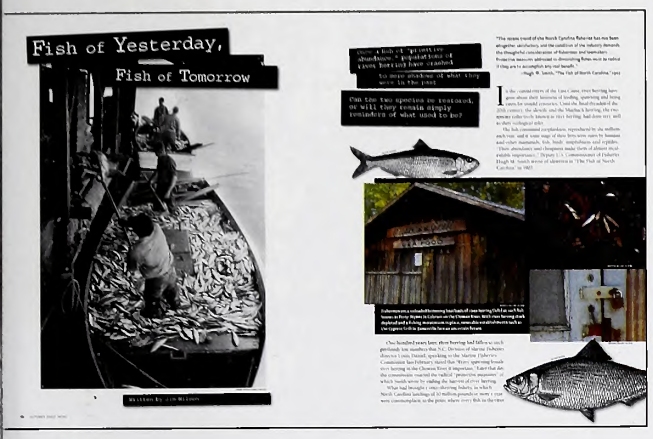

Herring Hegemony

Thank you, Jim Wilson, for a great article on river herring ("Fish of Yesterday, Fish of Tomorrow," Oct. 2007). This is the first publication on river herring that I have read that listed predation as one of the reasons for the decline of the river herring. I believe that we have created a major imbalance between predator and prey. I have seen the downswing of numbers of the river herring and the upswing in the numbers of striped bass, the main predator of the river herring, in my almost four decades of life.

I call the striped bass the main predator of the river herring for one main reason: The striper is anadromous as the river herring is, so it follows the herrings up the river to spawn and then follows them back to the ocean. Then the stripers are back again when the herring fry have hatched and are starting to make the trip to their home in the ocean. This is when I feel that most of the damage is being done. A school of 30 to 40 stripers weighing anywhere from 3 to 60 pounds can do a lot of damage when the herring are most vulnerable.

I only hope that state lawmakers will someday stop seeing dollar signs from a thriving sport fishing market and look at what is best for nature.

Mark Pierce
Eure

I grew up in Murfreesboro on the Meherrin River, and your article on river herring brought back many fond memories. One of my father's friends, Gene Reed, had a small commercial fishery about a mile upriver from town. As kids in the 1950s, my friends and I would bownet from our boats at the mouths of the many small streams and creeks that fed the river. During the peak of the migration period our nets would fill in seconds and we had to dump half the catch in order to lift the net back into the boat. Afterwards we would place them in bushel baskets and drive through town earning our spending money. Males went for a penny and females with roe were a pricey two cents.

My dad had an old whisky barrel which he used to "corn" (preserve) herring fillets for future consumption. Each layer of fillets were covered with a layer of salt and molasses and then stored in the basement. The night before we would soak them in the sink to remove the salt, and then pan- or deep-fry them. Delicious!

Joe Evans, Ph.D.
Rhododendron, Ore.

I thoroughly enjoyed Jim Wilson's article about herring fishing in the oft-neglected, much-maligned and now OLF-stressed wonderful Roanoke-Chowan section of the state. I would like two more copies of the magazine for friends who have had the misfortune to move away from the area. Also, I would love to get a copy of the 1863 map that is pictured in the article. I live in Woodland, which is also your former editor Jim Dean's matriarchal home and which provides substantial grist for his poetic writing mill.

Margaret Burgwyn
Woodland

The Legendary Persimmon

I have enjoyed reading your fine magazine for more than 50 years. "The Forgotten Persimmon" by Mark Joyner (Oct. 2007) really takes me back a lot of years. It was a pleasant surprise to see the recipe by Ola Cook. I have sampled her delicious "'simmon puddin'," or "'possum pie," as I call it. Ola Cook was my grandmother's sister. She was a wonderful, hardworking, joyful person. I will always remember her laugh.

The persimmon certainly should not be forgotten, as it is one of the great things in nature that God has given us. I try to share these things with my children and grandchildren every chance I get. I would also like to share the Legend of the Persimmon Seed with your readers. It is said that old-timers could predict the weather by looking inside the seed. If you cut the seed open flatways, you can see the white sprout where the seed was formed. It will always be in the shape of a fork, a knife or a spoon. The fork means a mild winter — the snow will sift through it. The knife means sharp or cold. The spoon means that we will have to shovel snow. I have opened the seeds for several years. They have usually been accurate.

Steve Evans
Mocksville

As irony would have it, I was struck with the incurable urge for persimmon pudding today, so I came home from work, grabbed a bucket and raided the persimmon trees growing in our woods. I went to my grandmother's with my bounty and she quickly grabbed the necessary bowls and pans to mix up the most delectable thing in the world. Later in the evening after our baking excursion I found the October issue of your magazine in my house (had to steal it away from my dad). The article, as well as the fruit, takes me back. Even though I am only 24, I have numerous fond memories of picking persimmons with my grandfather and dad.

I also relive this story every time we make pudding: When I was a little boy, I was helping my grandfather with the tedious task of mixing the persimmons to separate the skins and seeds from the "pure essence." When my mother called to ask what I was doing, I confidently replied, "Shucking slime!" To this day, my grandmother asks me to help her "shuck slime." I can't thank you enough for helping me back down memory lane twice in one day.

Brant Marlin
Salisbury

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THE GROUSE WHISPERER

Why do some ruffed grouse respond to loud noise fearlessly? The answer is unclear, but the behavior has been documented for a century and a half.

IF YOU KNOCK ABOUT IN THE OUTDOORS LONG ENOUGH, YOU'RE BOUND TO SEE SOME STRANGE ANIMAL BEHAVIOR. MAYBE IT'S A WILD TURKEY SWIMMING IN A LAKE OR A GROUNDHOG PERCHED IN A TREE—THEY ARE THINGS THAT MAKE YOU SHAKE YOUR HEAD AND MUTTER TO YOURSELF,

"I NEVER EVEN HEARD TELL OF THAT."

Written by Jim Wilson
Photographed by Russell Wyatt

It didn't take long before the grouse became even more familiar. "Now every time I go out there, he'll hear that four-wheeler. I'll sit there for awhile, and he'll come up right next to me."

The stories that intrigue many people are those in which a wild animal seems to establish some kind of relationship with a human. Perhaps being so close to a wild creature allows us, at least temporarily, to feel that we have slipped the confines of civilization.

Russell Wyatt of Madison County has been having one of those up-close-and-personal encounters for some months now. As Wyatt rode his ATV around his farmland in the summer of 2006, he began noticing a grouse flying close to him, closer than he would have expected of a bird known for its wariness and rocketing flushes when it is hunted. "I saw him two or three times and then, golly, one day he was there beside me," Wyatt said. Soon afterward, the grouse flew up behind Wyatt among some apple trees and landed about 15 yards away. The grouse also would appear when Wyatt was checking his clover plot.

It didn't take long before the grouse became even more familiar. "Now every time I go out there, he'll hear that four-wheeler. I'll sit there for awhile, and he'll come up right next to me."

As the grouse became bolder, it began to hop up on the toe of Wyatt's boot. "I've taken a twig and rubbed his back and his belly with it," Wyatt said. "The other day he grabbed my glove and just started fluttering. I've had him jump up and knock my cap off. He'll follow me around. I'll go to different spots and he'll find me. He's gotten pretty used to me now."

Why did this grouse strike up some kind of fowl relationship with Wyatt? Although no one knows for sure what is going on in that small, gallinaceous brain, for decades stories of weird grouse behavior have provided fodder for writers. Biologist Gardiner Bump included a short section in his massive 1947 book "Ruffed Grouse" entitled "Tame Grouse."

Tame is something of a misnomer, because the grouse Bump writes about — and Wyatt's grouse — are not domesticated fowl, they just act that way occasionally. Bump relates incidences of grouse that were attracted to the sound of automobile engines, and in the anecdote of "Billy and the Steel Mule," Bump tells about a grouse (Billy) that would display in front of a tractor with its engine running. Other birds were drawn to the sound of a man chopping wood and would perch atop a freshly cut pile of firewood and watch the proceedings. Another bird attracted by the sound of an ax could be summoned from the woods by banging two sticks together.

Bump concludes, as do biologists today, that the sound of an engine suggests to a grouse the male's springtime drumming, when the cock birds display to hens just how truly splendid they are by standing atop a fallen log or stump, puffing out their feathers and beating their wings. "[W]hat associations are inspired by the staccato ring of an axe, remains a mystery," Bump writes. (However, there might be some long-ago connection. Like many birds, ruffed grouse have numerous regional names. One of those is wood-pile quawker, which, according to Bump and the *Wilson Journal of Ornithology*, was a term used only on Long Island, N. Y.)

Ruffed grouse have been known to exhibit other odd behavior. In the fall, birds of the year occasionally kill themselves during periods of "crazy flight." These grouse take off in any direction and might fly into trees, houses or cars or simply end up in places where the secretive birds are not normally found. Crazy flight, also called the fall shuffle, has been blamed on the full moon or grouse eating late-season fermented berries, but biologists suspect that crazy flight is simply a method of young birds dispersing into new territory. Adult grouse, if they survive for a second season, tend to remain in their same home range.

The spruce grouse, a cousin of the ruffed grouse and a forest inhabitant of the northern United States and Canada, has long carried the name fool grouse or fool hen because of its lack of fear for humans. Theodore Roosevelt, writing in "The Wilderness Hunter" in 1903, said: "The mountain-men call this bird the fool-hen; and most certainly

ARCTIC CAT

it deserves the name. . . . They are marvelously tame and stupid."

Roosevelt also noted that ruffed grouse, under certain circumstances, could be equally as foolish. "The ruffed grouse, a very wary game bird in all old-settled regions, is often absurdly tame in the wilderness."

Numerous 19th-century writers, including pioneering ornithologist Alexander Wilson, had made the same observation. Writing in "American Ornithology" in 1832, Wilson noted that ruffed grouse normally are quick to flush. "With a good dog, however, they are easily found; and at some times exhibit a singular degree of infatuation, by looking down from the branches where they sit, on the dog below, who, the more noise he keeps up, seems the more to confuse and stupify them, so that they may be shot down, one by one, till the whole are killed, without attempting to fly off. In such cases, those on the lower limbs must be taken first; for, should the upper ones be first killed, in their fall they alarm those below, who immediately fly off."

In "American Game in Its Season" of 1853, Henry William Herbert related a similar experience but observed that this behavior occurred only "when the bird is in its natural solitudes, unacquainted with man and his murderous weapons."

Even today, hunters have encountered grouse that will simply stare at them and walk away, seemingly unperturbed and unimpressed by an encounter with "man and his murderous weapons."

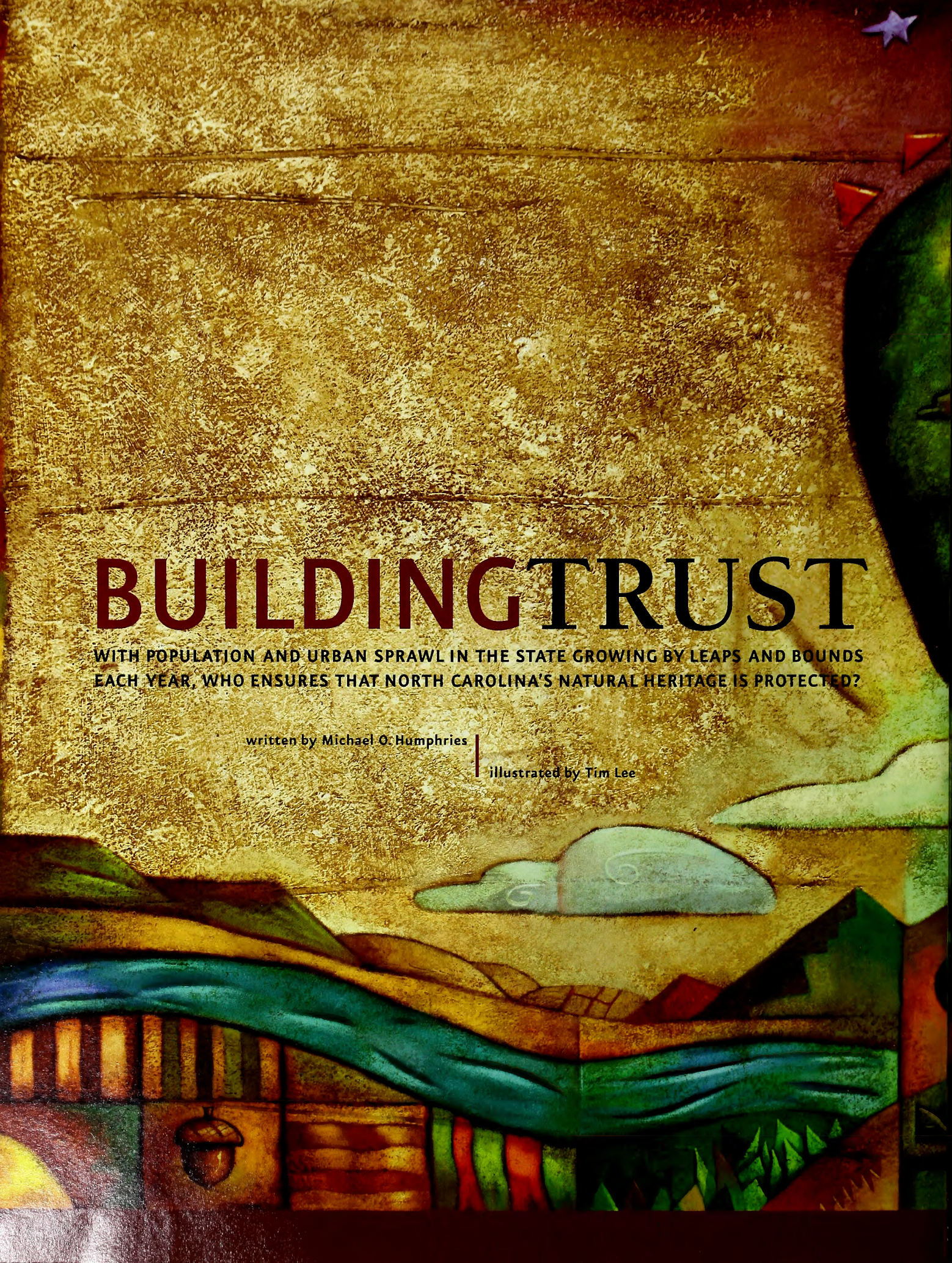
Obviously, lacking fear of humans is not a good survival strategy for wild animals. And just as obviously, making pets of wild animals—as people will do with fawns or other animals they believe are abandoned—is always a bad idea. Doing so without a permit also is against N.C. Wildlife Resources Commission rules.

Wyatt's grouse, however, is certainly not captive. And living as it does near cultivated areas, it is no wilderness bird either. (One might ask if there is enough deep wilderness remaining in North Carolina for there to be any wilderness grouse these days.) It was, actually, encroaching civilization that led Wyatt to give up grouse hunting. "Years ago I used to grouse hunt quite a bit," he said. "Then it got so everywhere you went, there was a housing development, so I got into bowhunting. It's been a long time since I've grouse hunted."

Why this bird came to have no fear of Wyatt and seek out his company is something that will forever remain inexplicable, but it provides an unforgettable experience. Wyatt himself doesn't have a theory as to what's going on. "It's just real strange," he said. ◆

Jim Wilson is the associate editor of Wildlife in North Carolina.

Even today, hunters have encountered grouse that will simply stare at them and walk away, seemingly unperturbed and unimpressed by an encounter with "man and his murderous weapons."



BUILDING TRUST

WITH POPULATION AND URBAN SPRAWL IN THE STATE GROWING BY LEAPS AND BOUNDS EACH YEAR, WHO ENSURES THAT NORTH CAROLINA'S NATURAL HERITAGE IS PROTECTED?

written by Michael O. Humphries

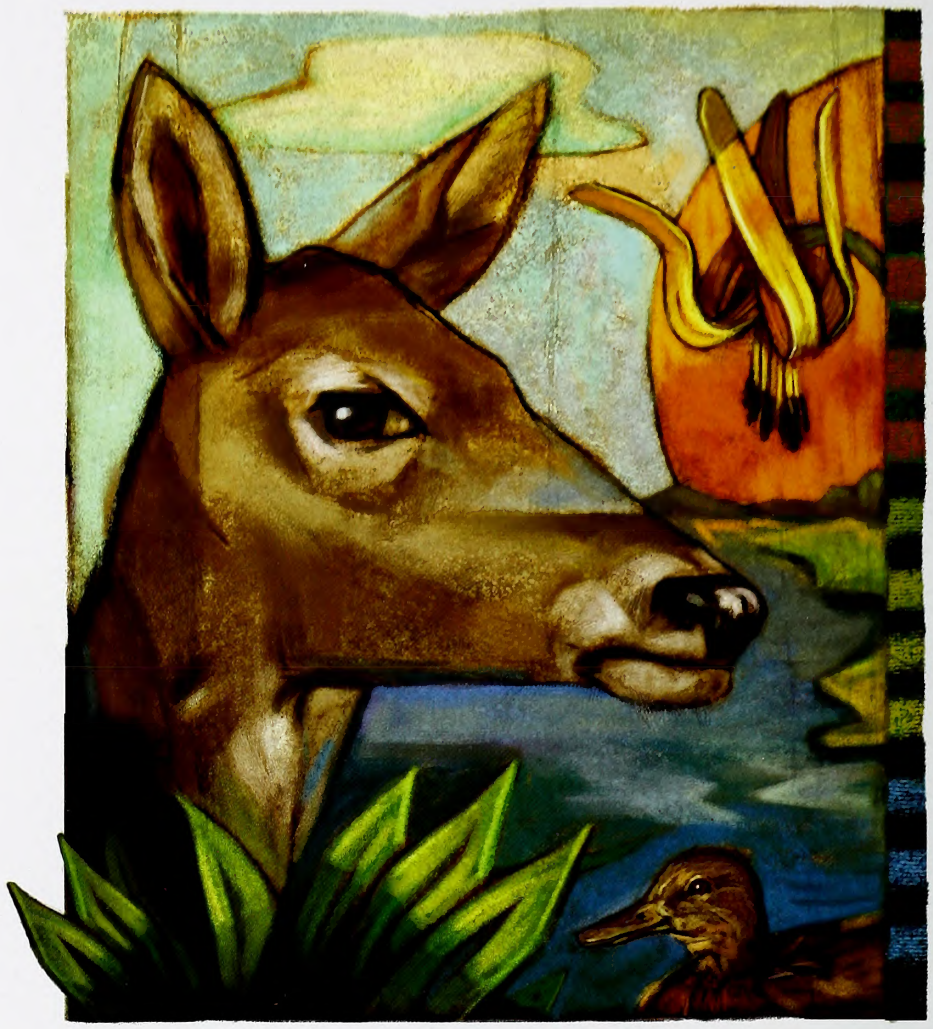
illustrated by Tim Lee

It would be easy to think that the widespread development of North Carolina's land is unstoppable and that the growing human population will eventually overwhelm the natural heritage of the state. However, the state's natural treasures, ranging from beautiful Coastal Plain lands to the rich Piedmont and Mountain regions, have had an ardent and effective defender for the past two decades: North Carolina's Natural Heritage Trust Fund (NHTF).

Founded in 1987 by the N.C. General Assembly through legislation sponsored by state senators Lura Tally and Marc Basnight, the NHTF was begun by those who correctly foresaw that population growth and development would have a severe impact on the natural treasures of the state. The NHTF is a trust fund created and funded by the state to acquire natural lands for the protection of recreation areas, forestry resources, and fish and wildlife habitats. Lands purchased with NHTF funding become part of the state-owned system of parks, wildlife game lands and fish and wildlife management areas—all open to the public.

Celebrating its 20th anniversary this year, the NHTF has spent the past two decades ensuring that there is a permanent source of funding available to help state agencies acquire and protect important natural areas and resources. During these years, the NHTF has awarded more than $194 million to nearly 400 individual projects, resulting in the protection of more than a quarter-million acres of land. However, we should not let these admittedly impressive numbers lull us into a state of complacency. Much more needs to be done.

Many experts believe that the state's population, which has experienced unprecedented growth in the past two decades, will grow by another 50 percent over the next 25 years. One North Carolina Naturally, a program managed by the N.C. Department of Environment and Natural Resources' Office of Conservation and Community Affairs, estimates that our state loses approximately 383 acres of woodland, farmland and open space per day.



DOING MORE WITH LESS

To have accomplished so much, the Natural Heritage Trust Fund is a remarkably small organization. Consisting of a 12-member board of trustees and an executive director, the NHTF has had an impact on the land conservation movement disproportionate to its size. The executive director, Lisa Reigel, is the only full-time state employee in the group and oversees the day-to-day functioning of the trust fund. The 12 members of the board are appointed for staggered six-year terms, with four trustees selected by the governor and eight by the General Assembly (four by the House and four by the Senate).

The NHTF allows four state agencies to apply for grants: the N.C. Department of Agriculture, the N.C. Department of Cultural Resources, the N.C. Department of Environment and Natural Resources and the N.C. Wildlife Resources Commission. The trustees review grant applications and make decisions on which will receive funding.

THE CHALLENGE

Bob Gordon, current chairman of the NHTF board of trustees as well as a former chairman of the Wildlife Commission, recognizes the threat the state faces. "One only has to look at the growth on our coast and in our mountains to see the urgent need to preserve our state's open spaces," he said. "Every year we lose more than 100,000 acres of forests, farmland and open space. Between 2002 and 2005, the number of farms declined by 6,000, and more than 300,000 acres of farmland were developed."

Where does the NHTF acquire the money to fund this increasingly expensive effort? Since 1991, the NHTF's primary source of funding has been a tax on real estate deed transfers levied whenever real estate is sold. The fund receives one quarter of the state's portion of this tax. Supplemental sources of income include the interest on the fund itself and fees charged on some vehicle license plate sales. However, not all the funding comes from the state.

It is important to note that although the fund does have a steady source of income, keeping up with the increasing costs of real estate is an ever present and constant struggle. As a matter of fact, the NHTF generally can fund only half of the applications it receives. In addition, many of the critical projects require matching funds from the federal government, as well as generous donations from individuals and private groups, to make them happen.

Ironically, although the recent surge in real estate prices is making the fund's job much more difficult, it is also presenting terrific opportunities, of which the NHTF is striving to take advantage. In response to the growing demand for land, many industrial landowners have opened up huge tracts of timberland for sale. Rather than allowing it to be consumed by the private and commercial markets, the NHTF is striving to set aside some of this property for protection. Unfortunately, that is expensive.

Recognizing that the combination of rising real estate prices and a deluge of land on the market that was in need of protection was creating a unique opportunity, the General Assembly in 2007 authorized an additional $50 million for the NHTF in what are known as Certificates of Participation. It is important to note that, unlike the fund's normal income, this revenue is a loan of sorts that must be paid back from the future income of the fund. Although that puts a financial strain on the future of the NHTF program, it has allowed the trust fund to access the money needed to step in and act now, while lands are available and priced more affordably than they may be in the future.

MANY EXPERTS BELIEVE THAT THE STATE'S POPULATION, WHICH HAS EXPERIENCED UNPRECEDENTED GROWTH IN THE PAST TWO DECADES, WILL GROW BY ANOTHER 50 PERCENT OVER THE NEXT 25 YEARS. ONE NORTH CAROLINA NATURALLY ESTIMATES THAT OUR STATE LOSES APPROXIMATELY 383 ACRES OF WOODLAND, FARMLAND AND OPEN SPACE PER DAY.

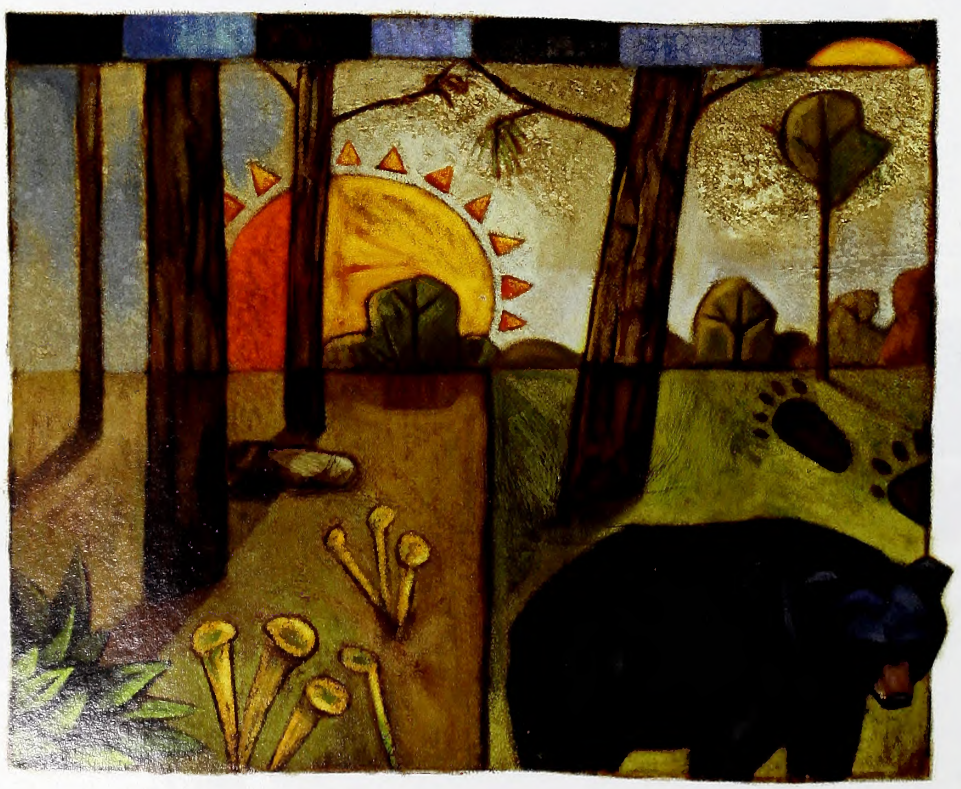
RESOURCEFUL PARTNERS

Over the past 20 years, the NHTF has cultivated an extremely good working relationship with the Wildlife Commission, combining efforts to help obtain large tracts of land for current and future generations of North Carolinians to enjoy. In fact, the Wildlife Commission and the NHTF have very similar goals. With the help of the trust fund, the commission has the means to acquire the game lands necessary to achieve its goal of ensuring the wise use, conservation and management of the state's fish and wildlife resources.

Fred Harris, interim executive director of the Wildlife Commission, points out, "The Wildlife Resources Commission has worked closely with the NHTF and other conservation partners to identify and preserve valuable plant and wildlife habitats. The ability of the fund to purchase such habitats, coupled with the ability of the commission to manage them in a way that maintains the desired natural heritage values, has greatly benefited the citizens of the state."

"THE WILDLIFE RESOURCES COMMISSION HAS WORKED CLOSELY WITH THE NHTF AND OTHER CONSERVATION PARTNERS TO IDENTIFY AND PRESERVE VALUABLE PLANT AND WILDLIFE HABITATS. THE ABILITY OF THE FUND TO PURCHASE SUCH HABITATS, COUPLED WITH THE ABILITY OF THE COMMISSION TO MANAGE THEM IN A WAY THAT MAINTAINS THE DESIRED NATURAL HERITAGE VALUES, HAS GREATLY BENEFITED THE CITIZENS OF THE STATE."

–FRED HARRIS, INTERIM EXECUTIVE DIRECTOR, NCWRC



Since the NHTF's inception in 1987, it has helped the Wildlife Commission preserve more than 100,000 acres of conservation land. As a matter of fact, along with the Clean Water Management Trust Fund, the NHTF has been a driving force for the commission in regard to land acquisition. According to George Norris, a grants/contract biologist with the Wildlife Commission, "Without the NHTF, land acquisition as we have known it would have been impossible."

NHTF board of trustees member Dewey Wells sees the relationship as a two-way street: "The Wildlife Resources Commission's grant applications have enabled the trust to make a difference in lives and opportunities of unborn generations. It has been the major recipient of grants, and deservedly so, since through its applications the larger tracts can be protected."

SUCCESSES

Over the past 20 years, the Wildlife Commission and the NHTF have had some significant successes in the acquisition and application of funding to help acquire and protect important tracts of land. Following are some highlights:

Green River Game Land: Carried out in 1994, the acquisition of this large tract of land resulted in the protection of more than 5,000 acres of the Blue Ridge escarpment in Polk and Henderson counties. Part of a large tract of land put up for sale by Duke Energy, this land was purchased with an award from the NHTF for the commission's Green River Game Land. Made up of narrow gorges, steep ravines and coves, this relatively undisturbed wilderness area is a treasure trove for nature lovers. The Green River winds through the area.

Rollins Tract: Constituting an enormous 17,648 acres of high-quality hickory, oak and chestnut oak forest, the Rollins Tract (part of South Mountains Game Land) was acquired in 1997. The large and expansive block of unfragmented forest, heavily populated with a large number of deer and turkeys as well as a few bears, covers sections of Burke, Cleveland, McDowell and Rutherford counties. In addition to the thriving and vibrant wildlife communities, the area is home to 22 rare plant species, including the ultra-rare small whorled pogonia orchid.

North River Game Lands: Acquired in 2000, the North River Game Lands in northeast North Carolina comprise 2,000 acres of high-quality marsh in both Currituck and Camden counties. Viewed as one of the best waterfowl habitats in the state of North Carolina, this wetlands complex is also home to roughly 90 acres of virgin bald cypress. In addition, the area is quite important to native wildlife such as bobcats and black bears.

Angola Bay Addition: Made up of 14,000 acres and acquired over the years 2002–2006, this large pocosin acquisition was funded solely by the NHTF. The tract, which was added to the Angola Bay Game Land, provided a corridor connecting this game land to the adjacent Holly Shelter Game Land. Funding for much of this enormous and significant purchase was made possible through the Certificates of Participation program, allowing the NHTF to provide the Wildlife Commission with the means to take advantage of this tremendous opportunity.

Needmore Tract: Acquired in 2003, the roughly 4,500-acre Needmore Tract is made up of multiple parcels on a 27-mile stretch of the Little Tennessee River between Franklin and Fontana Lake. Widely considered an ecological treasure, the tract is home to a host of endangered species and plants, boasting the greatest mussel diversity of all major North Carolina rivers. It is made up of an impressive combination of mountain floodplain forest, wetlands and habitat.

Carrington Tract: Containing 725 acres and acquired in 2005, the Carrington Tract added a large section of important longleaf pine forest to the Sandhills Game Land. Among the many benefits of this acquisition was the protection of a significant foraging habitat of the red-cockaded woodpecker, an endangered species tied to the longleaf pine forests. An added benefit for the commission has been the opportunity to employ longleaf pine habitat to aid in meeting its management and restoration goals for this significant natural resource.

Johns River Loop: Acquired in 2006, this tract of 400 acres is located at the junction of the Johns and Catawba rivers. The tract, made up of excellent areas of waterfowl habitat, will benefit both those who enjoy the outdoors as well as the wildlife that inhabit it by providing the area a much-needed segment of quality waterfowl habitat.

Upper Tar International Paper Tract: Acquired in 2007, this nearly 900-acre tract was purchased with the help of an NHTF grant. This acquisition, along the tributaries of the upper Tar River in Franklin, Halifax, Nash and Warren counties, was the result of the sale of enormous tracts of land by the International Paper Company. Part of this land will be included in the Shocco Creek Game Land, with the rest going to create the new Embro Game Land. The area is plentiful in freshwater mussels and fish and has dense deer populations.

Chowan River International Paper Tract: One of the most recent acquisitions, this 10,000-acre tract was purchased in 2007. Of particular note is 1,881 acres in Hertford County that is protecting the extensive hardwood swamps of the lower Meherrin, Wiccacon and Chowan rivers. These areas are significant, as they help protect water quality and anadromous fish nurseries.

THE FUTURE

What projects are the NHTF and the Wildlife Commission currently working on? One is Juniper Creek, an 18,500-acre wetland complex that connects the Green Swamp in Brunswick County to the Waccamaw River system in Columbus County. Another is the effort being made toward the protection of the Diggs Tract on the Yadkin River, a critical site for wetland-dependent birds as well as diverse freshwater species of fish and mussels.

Is this relationship that exists between the NHTF and the Wildlife Commission a sustainable, long-term arrangement? "Yes, definitely," says Fred Harris. "Frankly, without the fund many critical habitats would no longer exist. This fact, along with the shared goals between the Wildlife Commission and the NHTF, ensures that it will continue to be an essential participant in wildlife conservation in North Carolina."

Although the challenges facing those who wish to protect the natural treasures of the state are daunting, the NHTF is up to the task. Combined with the efforts of the Wildlife Commission and the support of both the people of the state and their elected representatives, the NHTF can continue to ensure that future generations can enjoy the natural wonders of this beautiful state. ◆

Michael O. Humphries is managing editor of Wildlife in North Carolina.

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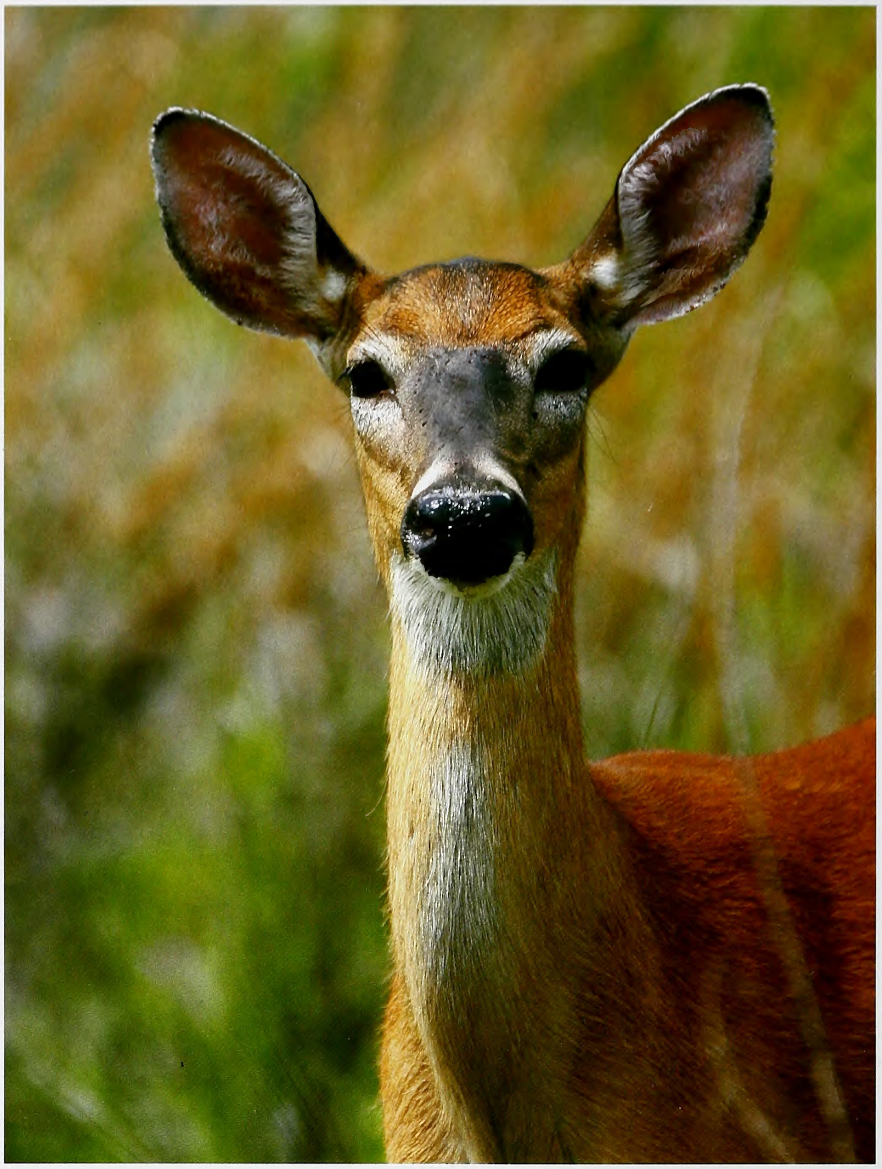
Where the Wild Things Roam

IN THE HEART OF THE ALBEMARLE-PAMLICO PENINSULA, ONE CAN FIND ANIMALS LARGE AND SMALL, TERRESTRIAL AND WINGED, ON MORE THAN 100,000 PROTECTED ACRES OF LAKES, FORESTS AND FARM FIELDS.

WRITTEN AND PHOTOGRAPHED BY TODD PUSSER

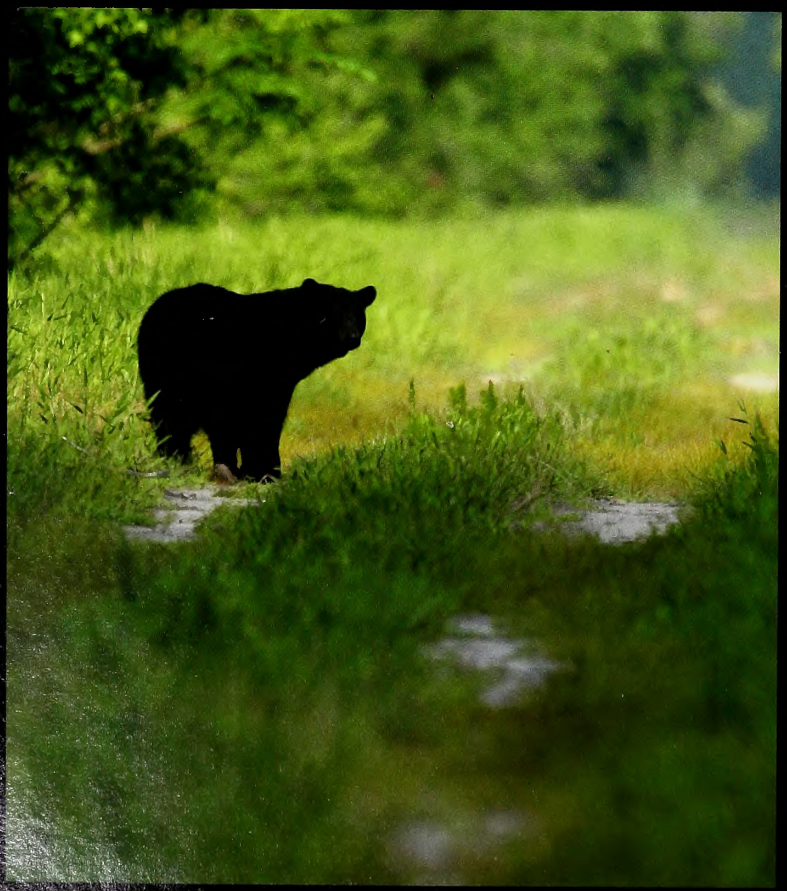
Snow geese are numerous enough to sometimes fill the sky at Pocosin Lakes, but black bears generally prefer a bit more solitude.



POCOSIN LAKES NATIONAL WILDLIFE REFUGE LIES OFF THE BEATEN PATH. LOCATED JUST SOUTH OF U.S. 64 AT THE INTERSECTION OF WASHINGTON, TYRRELL AND HYDE COUNTIES, THE REFUGE IS LARGELY IGNORED BY MOTORISTS TRAVELING TO AND FROM THE LONG, SANDY BEACHES OF THE OUTER BANKS. IN FACT, WERE IT NOT FOR RECENT MEDIA COVERAGE OF THE CONTROVERSIAL PLANS OF THE U.S. NAVY TO BUILD AN AIRSTRIP TO LAND MILITARY JETS NEAR THE REFUGE, POCOSIN LAKES WOULD REMAIN RELATIVELY UNKNOWN TO MOST NORTH CAROLINIANS.

AT 110,106 ACRES, THE REFUGE ENCOMPASSES A WEALTH OF HABITATS, FROM LARGE, SHALLOW NATURAL LAKES SURROUNDED BY THICK SWAMPLAND TO UPLAND PINE FORESTS AND EXPANSIVE FARM FIELDS. POCOSIN LAKES IS A WILDLIFE WATCHER'S PARADISE. SPEND A COUPLE OF HOURS DRIVING THE NUMEROUS BACK ROADS THROUGH THE REFUGE AT ANY TIME OF YEAR AND YOU ARE VERY LIKELY TO SEE A BLACK BEAR. THE REFUGE IS POSSIBLY THE BEST SPOT IN THE STATE TO OBSERVE OUR LARGEST NATIVE TERRESTRIAL MAMMAL. POCOSIN LAKES IS ALSO HOME TO NUMEROUS WHITE-TAILED DEER, RIVER OTTERS, WILD TURKEYS, SNAKES, TURTLES AND THE ENDANGERED RED WOLF.

White-tailed deer are plentiful at the refuge, but birds are perhaps the most abundant animals there. One can see diverse avian species such as Northern harriers (above right, hunting red-winged blackbirds) and shovelers.



How Do Pocosins Form?

See Nature's Ways, page 39.

IN THE WINTERTIME, THOUGH, THE REFUGE IS FOR THE BIRDS. ONE CAN WATCH NORTHERN HARRIERS — LARGE, BOLDLY PATTERNED RAPTORS — HUNTING FLOCKS OF RED-WINGED BLACKBIRDS AND GRACKLES. ADULT AND IMMATURE BALD EAGLES SOAR HIGH OVERHEAD, AND GREAT HORNED OWLS CALL AT DUSK. TENS OF THOUSANDS OF SNOW GEESE AND TUNDRA SWANS DESCEND INTO RECENTLY PLOWED CORN FIELDS. TO WATCH A HUGE, SWIRLING WHITE TORNADO OF THOUSANDS OF SNOW GEESE LAND IN ONE OF THESE FIELDS IS ONE OF THE GREATEST WILDLIFE SPECTACLES THAT CAN BE OBSERVED IN THE STATE. FORTUNATELY FOR THE BIRDS AND BIRD WATCHERS, THE NAVY'S PLAN TO BUILD THE LANDING FIELD NEARBY HAS BEEN PUT ON HOLD INDEFINITELY BY COURT ORDER.

SO THE NEXT TIME YOU DRIVE TO THE OUTER BANKS FOR VACATION, STOP AT THE REFUGE'S HEADQUARTERS AND VISITOR CENTER IN COLUMBIA, JUST OFF U.S. 64. LOOK AT THE EXHIBITS ILLUSTRATING THE LOCAL FLORA AND FAUNA. TALK TO A RANGER ABOUT THE REFUGE. OR BETTER YET, DRIVE ONE OF THE BACK ROADS LOCATED IN THE REFUGE AND EXPERIENCE FIRSTHAND THE WILDLIFE THAT MAKES THIS PLACE SO SPECIAL. ◆

Todd Pusser is a marine biologist and a frequent contributor to WINC.

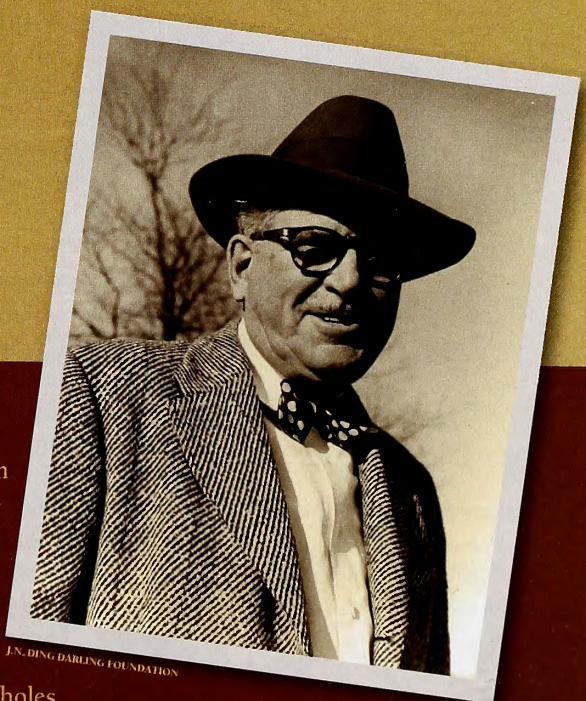
Tundra swans (above left and immediately below) are legion during winter at Pocosin Lakes but return to Canada to mate. Charismatic species such as black bears and bald eagles like this immature bird are year-round residents that breed on the refuge.

The phenomenal success of the federal duck stamp program is the legacy of pioneering conservationists and the unique set of political, economic and ecological circumstances that made their work possible.

written by ERIC G. BOLEN

MELISSA McGAW / NCWRC

Ducks, Dust, Depression & Ding



J.N. DING DARLING FOUNDATION

As chief of the Bureau of Biological Survey, Ding Darling helped create the federal duck stamp program, which has generated more than $700 million for conservation.

The fledgling administration of Franklin Roosevelt faced immense difficulties in 1933. Economic ruin plagued the nation, causing banks to fail and leaving millions out of work. Mother Nature added her own fuel to the economic fire when a prolonged drought wrecked farm economies in what soon was dubbed the Dust Bowl.

Dark clouds of loose soil blew unchecked across the heartland of North America, leaving not only depleted topsoil and withered crops but also the exposed, sun-baked bottoms of parched wetlands. Vast numbers of mallards and pintails, redheads and canvasbacks, shovelers and teal simply disappeared along with the marshes and potholes. Like the stock market, waterfowl populations crashed to their lowest ebb in memory when rainfall failed year after year.

President Roosevelt responded to both situations with an alphabet soup of government programs collectively known as the New Deal. Men went to work on Tennessee Valley Authority projects, in the Civilian Conservation Corps and with a host of other measures designed to rein in the Great Depression and Dust Bowl—not the least of which was formation of the Soil Conservation Service, now known as the Natural Resources Conservation Service (see "Son of the Soil," Jan. 2002).

J.N. DING DARLING FOUNDATION

Darling's hastily drawn sketch of two mallards adorned the first federal duck stamp in 1935.

However, not everyone fully agreed with Roosevelt's programs, which some thought smacked too much of social engineering. One of these critics was a gifted cartoonist at the *Des Moines Register* whose subject matter often poked a finger in the eye of the New Deal. By any measure, the skilled artwork of Jay N. "Ding" Darling was well matched with his clever wit. As his work gained notice — he twice won a Pulitzer Prize — Darling's cartoons were syndicated through the *New York Herald Tribune* and eventually reached 130 daily newspapers.

When not dealing with politics, Darling typically turned to conservation issues as subject matter for his cartoons. Poachers and others who exploited wildlife were common targets, and when the ravages of the Dust Bowl struck, he vigorously championed the conservation of soil and water resources. Waterfowl held a special niche in Darling's cartoons, and his drawings often highlighted their plight as the once-abundant flocks dwindled from what seemed to be an unending drought. Still, the New Deal frequently remained the bull's-eye for his cartoons — nettlesome pinpricks that did not go unnoticed in the White House.

Roosevelt again responded with direct action, this time by appointing Darling as chief of the Bureau of Biological Survey, predecessor to what in 1940 became the U.S. Fish and Wildlife Service. In a deft stroke, the president had chosen a nationally known conservationist to head the government's lead wildlife agency while slyly ending Darling's political attacks on the New Deal. Darling was now on the inside of government, but any thoughts that he would quickly fade into the bureaucratic woodwork were soon dispelled.

Darling, perhaps unknown to Roosevelt, was a human dynamo, replete with Phi Beta Kappa key, administrative skills and a good dash of verve. (He once actually snookered FDR out of $5 million when Sen. Peter Norbeck of South Dakota engineered a change, overlooked by the president, in legislation concerning the bureau's budget.) Darling immediately expanded the national wildlife system, which he made sure included a good number of refuges devoted to waterfowl and wetland protection. Using his own money, he also initiated a series of Cooperative Wildlife Research Units on university campuses across the nation — including one later established at N.C. State — thereby establishing a steady stream of college-trained field biologists that continues today.

But for many, it was Darling's successful promotion of the Migratory Bird Hunting Stamp that secured his legacy in the annals of wildlife management. The stamp was first issued in 1934 and bore his illustration of two mallards braking as they descended for a graceful splashdown. Darling hastily sketched the drawing on a piece of cardboard, thinking that his handiwork would serve only as a suggestion of what was needed, but the Bureau of Engraving used his mallards without looking for more refined artwork. Today, several hundred artists compete for this singular honor with painstakingly crafted designs that meet specific criteria. The first stamp sold for $1 and produced $635,000 — a hefty sum indeed during the Depression years. With such an annual income bolstering the uncertain annual congressional appropriations, the preservation of waterfowl habitat could begin in earnest.

Widely known by its popular name, the "duck stamp" is required by anyone 16 years or more of age who hunts waterfowl — ducks, geese and swans. Despite its formal name, duck stamps are not required for hunters of doves, cranes, woodcocks or other migratory game birds. In 1977, the stamp was renamed the Migratory Bird Hunting and Conservation Stamp to recognize the participation and commitment of nonhunting conservationists who purchase the stamps solely for the purpose of contributing to wetland conservation.

A good number of stamps, some of which later may appreciate in value by hundreds of dollars, are bought by collectors. A duck stamp also serves as an admission ticket for entry into any of the more than 500 federal wildlife refuges; just one stamp will suffice for a carload of visitors. The stamps are available at select U.S. Post Offices, most major sporting goods retailers that sell hunting licenses and the N.C. Wildlife Resources Commission. Stamps also may be purchased online at http://shop.usps.com and www.duckstamp.com.

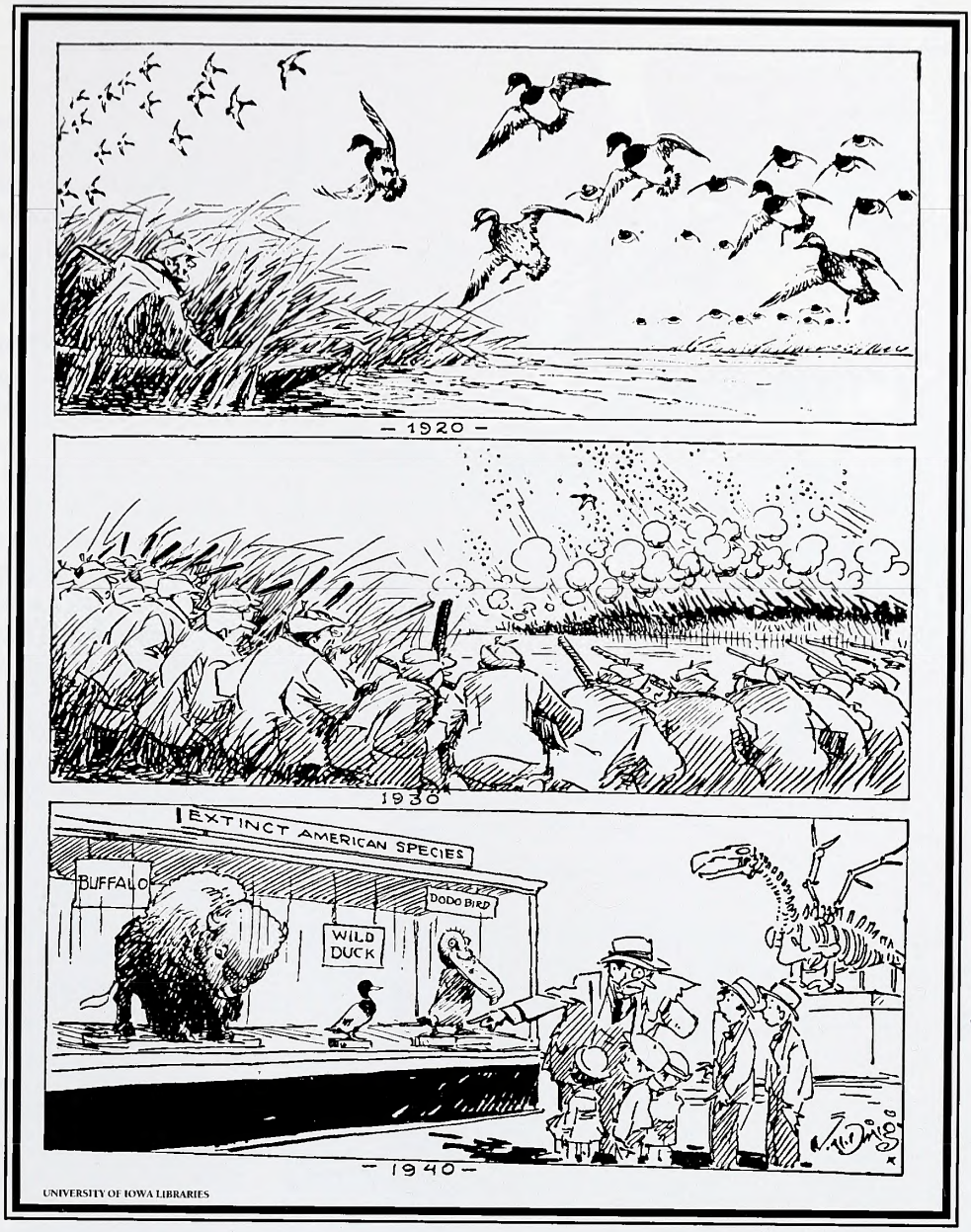
It's essential to underscore that wetlands conserved for waterfowl concurrently provide refuge for scores of other species—fish, amphibians, reptiles, wading birds and songbirds, aquatic mammals, and a myriad of invertebrates—including those listed as threatened or endangered. Hence, a wetland acquired by duck stamp revenues serves a vast and complex community of plants and animals. Moreover, protected wetlands provide vital ecological services such as filtering groundwater and surface water, reducing sedimentation and erosion, and storing floodwaters—values promoted by Darling, along with those concerning waterfowl. In this regard, he considered waterfowl and shorebirds as "delicate indicators of the prognosis for human existence" in assessing the management of wetlands and other water resources. Indeed, the success and impact of the federal duck stamp program in wetland conservation spurred California and then other states into issuing similar stamps.

A Rocky Road

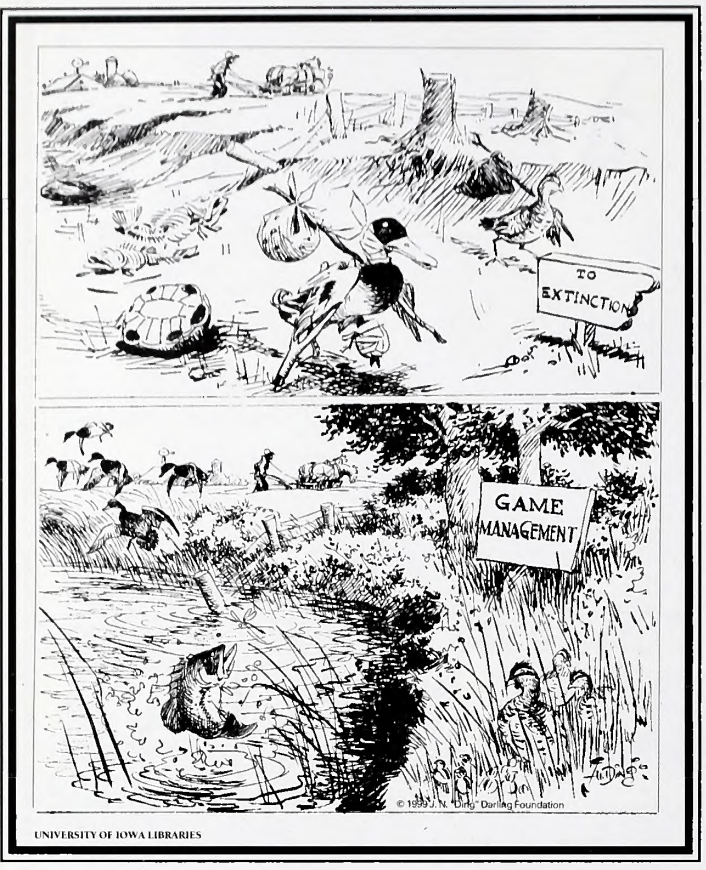
The idea for a duck stamp preceded Darling's brief tenure in the Roosevelt administration (he left after just 18 months to organize and lead the National Wildlife Federation, now the largest citizen-based conservation organization in the United States). However, the route to the duck stamp was neither straight nor clear of obstacles. In 1919, with an awareness that waterfowl habitat needed protection, George A. Lawyer, chief of the U.S. Game Warden corps, proposed a federal stamp for funding just such a mission. He reasoned that selling the stamps for 50 cents to hunters in post offices was not unlike selling war savings stamps to the public during World War I.

Lawyer emphasized that the effort would generate revenues for acquiring wetlands suitable for federal refuges—which were then acquired one at a time with appropriations from Congress—yet not require a new bureaucracy for selling the stamps. An enabling bill was introduced in 1921 and quickly gained broad support from the National Association of Audubon Societies, the U.S. Department of Agriculture, the Boone and Crockett Club and the American Game Protective Association, among others.

However, the bill also included provisions for establishing public shooting grounds,



In the 1930s, drought and excessive harvest had sent waterfowl populations plummeting (above). Darling believed that the loss of any species was an ill omen for mankind. His advice on politicians' promises was to get them in writing (right).



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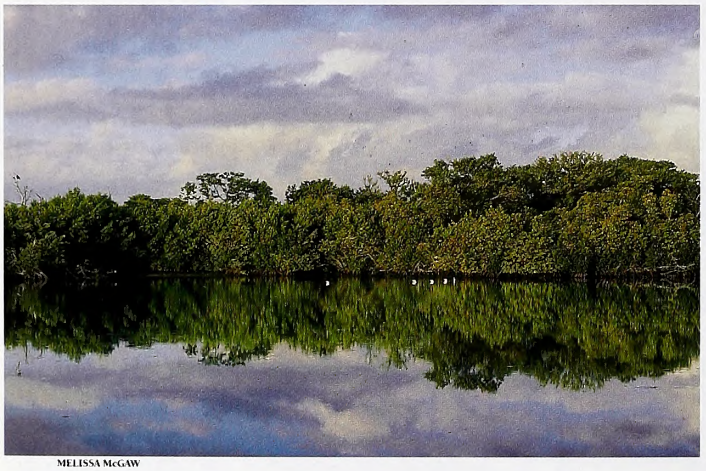

MELISSA McGAW

Darling was a persistent exponent of wildlife management (top) and the dangers of clear-cutting without replanting (lower right). In 1967, a popular wildlife refuge in Florida (above) was named in his honor.

which attracted the wrath of those who believed that the legislation was another means of eroding states' rights in favor of increasing federal power. The measure passed in the Senate but failed in the House. In 1924, the bill was again introduced, with added support from such diverse groups as the National Federation of Women's Clubs and the American Forestry Association, as well as editors of the *New York Times* and the *Saturday Evening Post*, yet it foundered when the Senate adjourned without considering it. It failed once more in 1926 after fierce attacks from William T. Hornaday, director of the Bronx Zoo and a strident believer that overhunting was at the root of wildlife shortages, and congressman (and later mayor) Fiorello LaGuardia of New York, who thought the bill actually was motivated by gun and ammunition manufacturers hoping to increase their sales and thereby fostering the wanton slaughter of waterfowl.

A breakthrough of sorts occurred in 1929 when Congress approved the Migratory Bird Conservation Act, subsequently signed by Pres. Herbert Hoover. The legislation called for an annual appropriation of $1 million to establish refuges for migratory birds; for the first time, the nation made a commitment that would assure the systematic acquisition and protection of waterfowl habitat. Almost immediately, however, the financial malaise of the Great Depression swept across the nation, forcing Congress to tighten the government's purse strings, and few wetlands were actually acquired. Nonetheless, the bill did provide a mechanism for adding waterfowl habitat to the system of federal refuges, but it could work only if a steady and dependable source of money was found.

Then, almost 15 years after Lawyer's proposal, several powerful forces merged, beginning when Roosevelt and his New Deal charged into Washington, soon followed by the equally vigorous Darling. Next came enactment of the Migratory Bird Hunting Stamp Act in March 1934, just days after Darling took the helm of the Biological Survey. The bill was the result of renewed efforts by Sen. Frederic Walcott of Connecticut and Congressman Richard Kleberg of Texas to create an independent source of funding dedicated to a single mission; the new revenues formed the Migratory Bird Conservation Fund. All the while, the drought that continued its withering attack in the nation's heartland, along with the Great Depression, produced a buyer's market for abandoned land. Duck stamp money thus arrived just when it could achieve a "big bang for the bucks." The rest, as they say, is history.

A Success Story

The $1 price of the first duck stamps gradually climbed, eventually reaching the current price of $15 in 1991—increases that reflected the spiraling costs of land purchased for waterfowl habitat. Even so, the escalating price has barely kept pace with the purchasing power of the original $1. Still, since 1934, sales of the stamps have generated more than $700 million that, in turn, has enabled the purchase or lease of more than 5 million acres of wetlands and other habitat crucial to the needs of waterfowl. Moreover, to hasten the acquisition of wetlands before they disappeared forever, the reliable stream of funds each year provided collateral for multimillion-dollar loans from Congress.

Today the national wildlife refuge system includes 548 refuges, many of which were created or expanded with duck stamp revenues. At least one federal refuge is located in each of the 50 states, with 10 in North Carolina, including Mattamuskeet, Pocosin Lakes and Pea Island. Mackay Island, a refuge on Knotts Island in the Currituck Sound, once was owned by Joseph P. Knapp, who in 1930 founded the conservation organization known today as Ducks Unlimited.

In addition to lands formally designated as national wildlife refuges, small wetlands known as Waterfowl Production Areas (WPAs) are acquired with duck stamp funds.

Most of these are the famous prairie potholes, the "duck factories" that each year yield a disproportionately large percentage of the continental duck crop. About 3,000 WPAs with a total area of 668,000 acres are currently included in the refuge system. More than 300 refuges are open to hunting, along with all of the WPAs.

Peak sales of duck stamps exceeded 2.4 million for the 1970–1971 hunting season but now average about 1.7 million, or enough to generate more than $25 million each year. Since 1934, waterfowl hunters in North Carolina have purchased nearly 1.6 million duck stamps. In the early years, some of the revenues were shunted into law enforcement, refuge maintenance and other activities, but since the law was amended in 1959, fully 98 percent of the funds have been expended exclusively for the purchase of important habitat. In some cases, grasslands near wetlands also are included in the purchases for the benefit of upland-nesting species.

Darling died in 1962 after establishing one of the most prominent legacies in the history of wildlife conservation. In 1967, a much-visited wildlife refuge in Florida was renamed the Jay N. "Ding" Darling National Wildlife Refuge in recognition of his lasting contributions—not the least of which is the legacy of the duck stamp.

Eric Bolen is an emeritus professor of biology at UNC Wilmington.

UNIVERSITY OF IOWA LIBRARIES

States Follow Suit

Individual states eventually recognized that they too could reap the benefits of issuing duck stamps. In 1971, California became the first state to issue a duck stamp, for $1. After the price was increased to $5 in 1978, the resulting revenues averaged in excess of $500,000 annually. The idea spread quickly, and at one time 49 states were issuing their own duck stamps, but in a few cases these are not required for hunting waterfowl. Some states have since stopped producing pictorial stamps.

In several states, some of the revenue is sent to Ducks Unlimited to support the acquisition of wetlands in Canada, principally in the prairie pothole region, where about half of the continental duck population is produced each year. As with the federal stamps, collectors add to the sales. Many states raise additional funds by selling limited-edition prints of the current year's stamp. Texas realized $587,000 from its share of prints of its first duck stamp in 1981.

North Carolina began issuing duck stamps and selling an accompanying waterfowl print in 1983. Like the federal stamp, the first North Carolina stamp featured a pair of mallards. Initially, the stamps, which cost $5, were sold on a voluntary basis, but in 1987, it became mandatory for waterfowl hunters to have a current stamp. On July 1, 1997, the Wildlife Commission switched to a privilege system and no longer issued stamps with hunting licenses. The stamp is still available upon request—subject to availability—for hunters who have purchased the waterfowl privilege. A perforated stamp also is available for collectors. In 2000, the price for the waterfowl privilege increased to $10.

Between various lifetime licenses and annual licenses, approximately 341,500 waterfowl privileges are in force each year. Sales of the North Carolina duck stamp have produced cumulative funds of more than $4.2 million during the history of the program.

Until 2007, an artist was commissioned to illustrate each year's stamp, and the Wildlife Commission selected the species and background. A series of stamps issued between 1989 and 1995, for example, featured a backdrop of one of North Carolina's famous lighthouses. More recently, the stamps highlighted some of the commission's game lands. Beginning in 2008, the winning artwork will be selected in open competition. The winner will be announced during the East Carolina Wildlife Arts Festival Feb. 8–10 in Washington. Additional funds are generated by the sales of limited-edition prints, signed and numbered by the artist.

The Roanoke River Wetlands and prime habitat at Goose Creek and the White Oak River are among the sites purchased with revenue from the sales of stamps and prints in North Carolina. The funds also are used to develop habitat with water-level control structures and wood duck boxes, as well as to support banding projects and the salaries of biologists and technicians assigned to waterfowl work. All told, the duck stamp program represents yet another way to assure the conservation of a precious resource—North Carolina's waterfowl habitat.

—Eric G. Bolen

Patches' Last Hunt

A hunter's faithful sidekick summons the courage for one final point and retrieve.

I watched an old man pick up an old dog and carry him to the truck. Not a young man myself, I've seen many examples over the years of men who truly care about their dogs. However, this wasn't just affection—it was more than that.

But first, let's back up a little bit in the story. There is a group of us, seven in all, who served on a state board together. For more than 15 years, we have bird hunted together every January. Each fall we make a fishing trip to the Outer Banks. Lately, we've added a December duck hunt at Lake Mattamuskeet.

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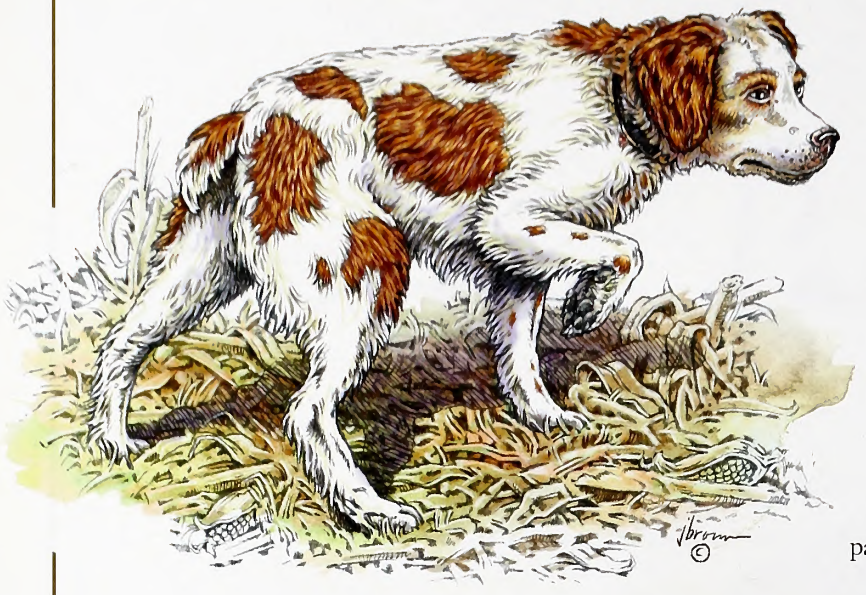
A Tradition One of those Januaries, we met at the office of R.B. Smith, a member of the group. Once the preliminary "hellos" and catching up on each others' families were accomplished, we crossed the street to Conrad and Hinkles, a small grocery store.

If you are over 50 years of age, which all seven of us are, a visit to this grocery store is a step back in time. It is the same type of store where we went to buy the family's weekly food supply with our mamas when we were young. Where else could you get the mixed aromas of apples, oranges, onions, sweet potatoes and other produce sitting in wooden bins in an area no bigger than a good-sized double garage? The meat market part of the store is in the next room, but it doesn't have much meat displayed. You tell a butcher—dressed in a white coat, naturally—what you want. He cuts it fresh. This is not true just of steaks and pork chops but even sandwich meats.

WRITTEN BY GARY E. TRAWICK

ILLUSTRATED BY JIM BROWN



Once we had acquired more food than anyone would need for a week, we headed for Wildcat Mountain, where we would hole up for the next three days. The groceries were transported in the back of one of our trucks, but not R.B.'s. In the back of his truck was a dog box occupied by Patches, a blond Brittany with brownish red patches.

Wildcat is located between Lexington and Denton, home of the Old Threshers Reunion. We stay in a farmhouse there. When we arrived, we were met by R.B.'s brother, Jerry, and legendary Davidson County bird dog trainer Don Jones. Don had brought dogs from his kennel, dogs with champion bloodlines.

We hunted that Thursday afternoon, all day Friday and also Saturday morning. Two of us would go with Don, two with Jerry and two with R. B. With each hunt we changed partners and went to different locations.

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Old faithful Everyone had good hunts. Everyone, that is, except Patches. He was 16, and that's 112 in people years. In addition to simply being old, he had arthritis. R.B. knew he could not go up and down the rocky terrain of Wildcat Mountain like Don's pointers. Each time we left for a hunt, Patches could be heard whining in his box. He knew we were going hunting and he was not.

By the time we had finished lunch on Saturday, R.B. could not stand it anymore; he wanted to take Patches out one more time. He said he was going to take him to the little millet field beside the lake and asked if anyone wanted to go. Steve Culbreth and I said we would go; we had hunted there that morning and knew we had left some birds.

Normally we walk the short distance to the field, but R.B. said he was worn out. "Let's drive," he said. Steve nudged me and said, "He's making excuses for Patches." It seemed Patches knew he was going. He barked, pawed at the door to the dog box and, although I know it's impossible, seemed to have a smile on his face.

We stopped at the edge of the little field and got out of the truck. R.B. went to the back and opened the dog box. Patches walked to the edge of the tailgate and looked down. He looked at R.B., who then gently picked him up and put him on the ground in front of him. Before Patches took off down the edge of the field, he brushed up against R.B., who reached down and rubbed his ears.

One run up and back along the edge of the millet plot, and Patches was hassling. He was reluctant to get into the field, as though he knew moving among the thick millet stalks would be more difficult than scouting along the edge.

For about half an hour, we shuffled up and down the rows of millet. The only bird we got was one Steve walked up and shot before R.B., Patches or I had even seen it.

Finally, Patches, completely exhausted, stopped hunting and just followed R.B., only inches from his heels. His tongue was

The shedding of tears is not something of which men are ashamed. However, they flow better in private.

hanging out; his breathing was measured and loud. Every once in a while, a coughing sound came from deep inside him. R.B. looked back at him and said, "I think he's had it; let's go."

As we headed to the truck, Patches seemed to get a second wind. He took off ahead of us, running down the side of the millet. Suddenly, about 25 yards ahead of us, he stopped, locked into a perfect point, with his head turned slightly toward the cover. R.B. became excited and rushed forward, motioning for us to come up.

R.B. was shouting commands: "Careful, careful, whoa, whoa, careful!" He asked us, "Are y'all ready? Come on up." We replied that we were, but neither of us raised our guns. R.B. kicked the millet stalks, a bobwhite flushed, R.B. fired and feathers floated down into the millet. Patches broke and ran into the cover as R.B. was commanding, "Hunt dead, hunt dead."

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A Final Run A few minutes later, Patches came from the millet plot, the bird in his mouth. He looked at R.B. and just lay down, completely exhausted. R.B. went to him, knelt down, rubbed his head and softly talked to him: "Good dog, good dog. Gimme the bird. Good dog, good dog."

He took the bird from Patches' mouth, then placed one arm under the dog's front legs and one under his back legs. Over his shoulder he asked, "One of you get my gun?" His own legs unsteady from both knee and hip replacements, R.B. gently carried Patches the 50 yards to the truck.

Few words were spoken as the three of us returned to the house. Steve and I had seen the tears running down R.B.'s cheeks as he took the quail from Patches' mouth. We all knew it was the last time he would ever do so.

The shedding of tears is not something of which men are ashamed. However, they flow better in private.

Steve and I were intruders and we knew it. We were observers of an important moment in time between a man and his dog that should have been private. We both wished we could have become invisible. ◆

Gary E. Trawick is a special superior court judge living in Burgaw.

While many birds may fly south for the winter, some other animals decide to stick around and take it easy. This is how they do it.

See You Later, Hibernator

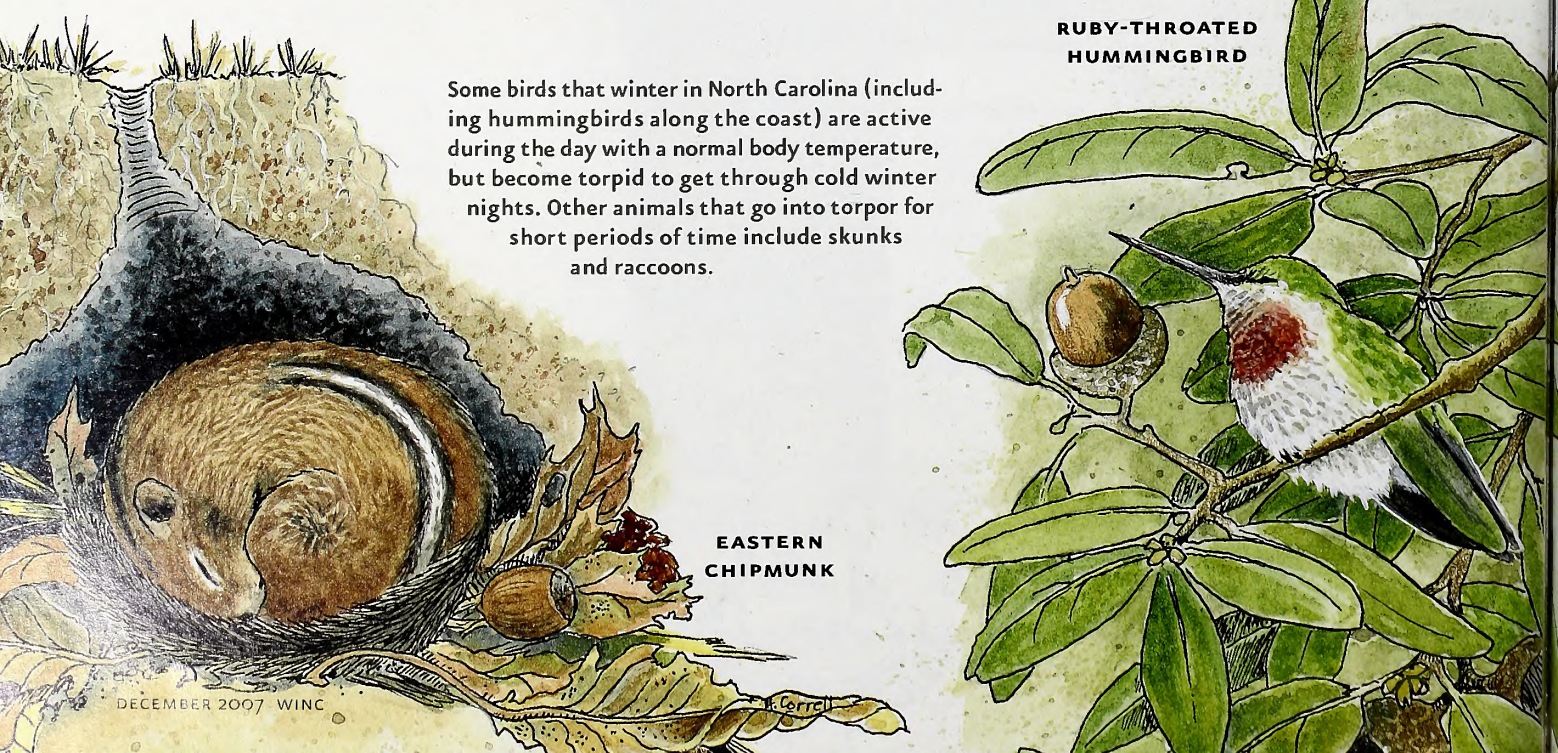
written and illustrated by Helen Correll / nature activity by Anne M. Runyon

Do you ever wonder how wild animals deal with cold weather? Where is the chipmunk that all summer nibbled birdseed under the bird feeder, the frogs you chased or the box turtle you found in your mom's garden? What do they do in winter?

GETTING READY

Wild animals have a variety of ways of dealing with cold weather. In early fall many animals instinctively begin to prepare for winter. By the time it's cold enough for you to put on your winter coat, some of North Carolina's birds and butterflies have left town, flying south where the temperature is warmer and food is still available. Squirrels bury nuts all over the place so that during winter they can dig them up like hidden treasure. Beavers cache leafy branches near the underwater doors to their lodge so they don't have to go far to find food. White-tailed deer have grown thick winter coats, which will keep them warm.

But, many of the animals in, and beyond, your back yard have found another way to cope with winter — they curl up and go into a deep sleep, or hibernation. Biologists have discovered that hibernating animals have something special in their blood known as HIT, which stands for "Hibernation Inducement Trigger." This is a substance that becomes active when the days become short (have less sunlight) or in the late fall when the days are cold.



Some birds that winter in North Carolina (including hummingbirds along the coast) are active during the day with a normal body temperature, but become torpid to get through cold winter nights. Other animals that go into torpor for short periods of time include skunks and raccoons.

LITTLE BROWN BATS

NOT JUST ANY SLEEPY TIME

In summer and fall, hibernators gorge on berries and other fruits, acorns, nuts and seeds to build up body fat. When the trigger induces hibernation, body temperature drops sharply, pulse rate slows and breathing becomes shallow. During hibernation, an animal lives off reserves of body fat it built while it was active. Depending on the animal, a hibernation bout may last several days, weeks or up to a month. No animal stays completely asleep for the whole winter. Most will rouse enough to eat and drink a little, then go right back into hibernation.

In North Carolina, little brown bats hibernate together in old mines, caves or hollow trees. They hang upside down and pull their wings and tails close to their bodies for warmth. Chipmunks hibernate deep in the ground, at the ends of long tunnels. Each keeps a cache of nuts and seeds in its burrow and wakes occasionally for mid-hibernation snacks.

Box turtles hibernate by burrowing deep under woodland soil and leaves. Painted turtles and all kinds of frogs choose mud at the bottoms of ponds. American toads dig deep into loose soil, while Carolina anoles and skinks hide behind loose bark, in rotten wood, in woodpiles, or even behind your house siding. Mourning cloak butterflies hibernate in similar places and waken on warm days. They are often the first butterflies seen in the spring.

It is very difficult to wake up a hibernating animal. If you were to find a hibernating chipmunk you would probably think it was dead. The chipmunk would be completely still and cold to the touch.

NAPPING IN THE DEN

Black bears are not true hibernators, but they do prepare a cozy spot (called a den) for their winter naps in protected places such as rock crevices or roots of blown-down trees. Like true hibernators, black bears have ravenous appetites, and during summer and fall gobble as much food as they can find to help build up their stores of body fat. When winter arrives they crawl into their dens and go to sleep. They don't eat, drink or excrete during the entire time they are denning. Instead, their bodies use energy stored in the built-up fat, and they have evolved a way to recycle their waste products.

So, what is the difference between true hibernators and black bears? True hibernators become torpid when they hibernate. Torpor is sort of a state of regulated hypothermia; there is a sharp drop in body temperature, heart rate and breathing. A truly hibernating animal that is torpid cannot be easily roused. In comparison, a black bear's temperature only drops about 10 degrees, and the heart rate and breathing rhythm drop only slightly. Black bears are aware of their surroundings while denning. They wake easily. Female bears give birth to cubs during winter, cleaning, snuggling and nursing them in the den between bouts of sleep.

BLACK BEAR

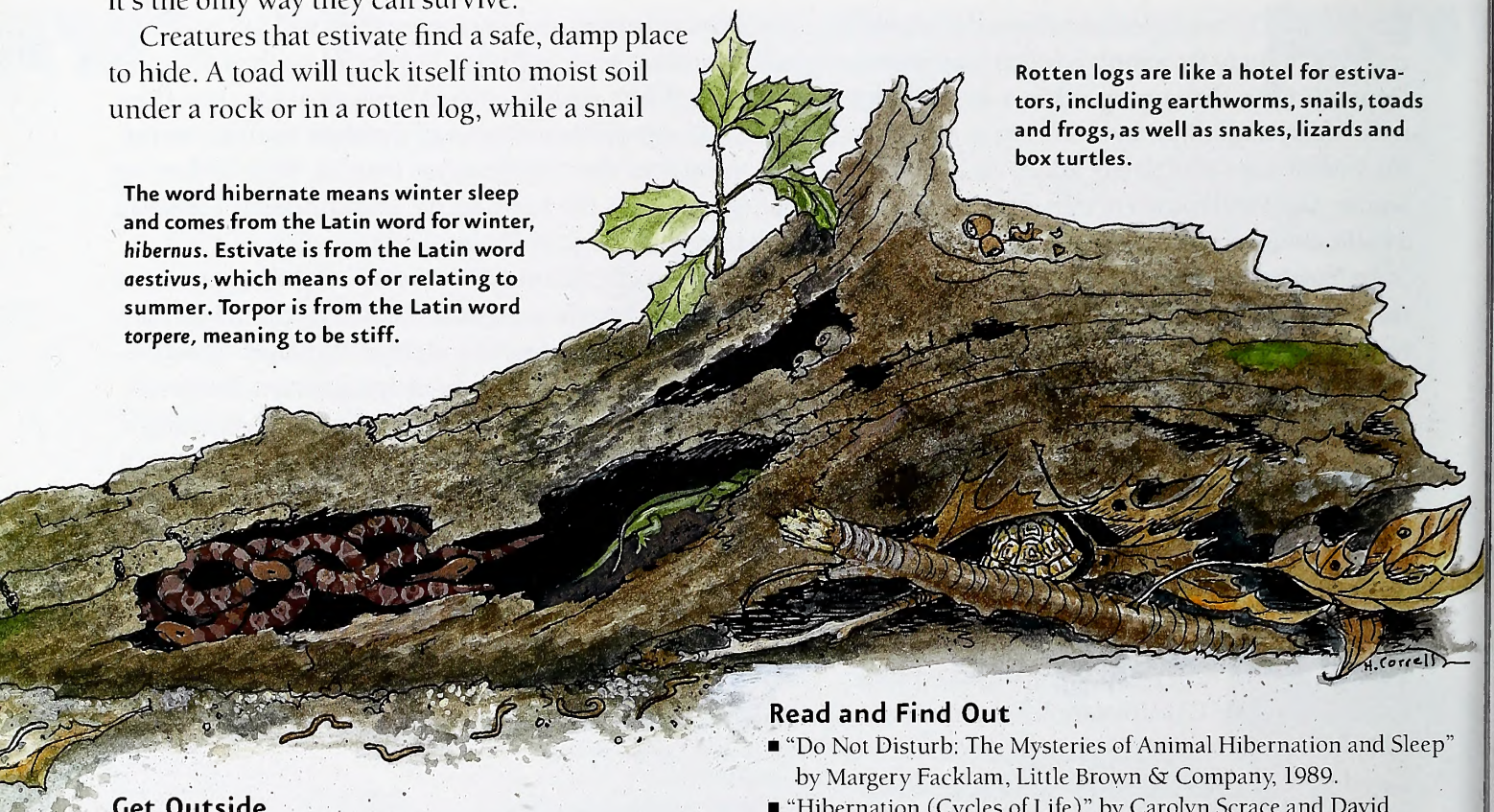
SAME THING, DIFFERENT SEASON

Some animals such as snails, frogs and toads not only hibernate in winter, they also become torpid in summer, which is called estivation. Estivating helps moisture-loving animals avoid hot and dry environments. Reptiles and amphibians are ectothermic, which means their bodies are regulated by the temperatures around them. On a hot, 105-degree August day, the animal's body temperature could reach 105 degrees as well. Estivating in cool places is how reptiles and amphibians avoid high temperatures. In fact, it's the only way they can survive.

Creatures that estivate find a safe, damp place to hide. A toad will tuck itself into moist soil under a rock or in a rotten log, while a snail slides into a shady crevice and seals its shell opening with a dry layer of mucus to keep the moisture in. As in hibernation, the animal's breathing and heartbeat slow down until it is using very little energy and the body needs little food or water.

Whatever the sleepy-time is called, biologists are still studying animals' ability to sleep through freezing cold or sweltering hot weather. Nature still holds many mysteries.

The word hibernate means winter sleep and comes from the Latin word for winter, *hibernus*. Estivate is from the Latin word *aestivus*, which means of or relating to summer. Torpor is from the Latin word *torpere*, meaning to be stiff.



Rotten logs are like a hotel for estivators, including earthworms, snails, toads and frogs, as well as snakes, lizards and box turtles.

Get Outside

Hunt for a hibernator. December is a good month to hunt for a hibernator—but not just any hibernator. Clearly you can't swim to the bottom of a pond in the winter to find turtles or frogs tucked into the mud. Neither do you want to enter a cave and disturb hibernating bats because their frantic fluttering depletes their stored food and they could easily die of starvation before springtime. Naturally, searching for bears that wake easily is not a good idea either.

But green anoles are friendly reptiles. Look for these lizard hibernators under loose bark, in a log pile, rotten log or even under house siding. You might also find beetles or snails. While you search, make a list of the different places you looked and what sleeping critters you found there. Look, but please don't touch!

Read and Find Out

- "Do Not Disturb: The Mysteries of Animal Hibernation and Sleep" by Margery Facklam, Little Brown & Company, 1989.
- "Hibernation (Cycles of Life)" by Carolyn Scrace and David Salariya, Franklin Watts, 2002.
- "What Do Animals Do in Winter? How Animals Survive the Cold" by Melvin Berger and Gilda Berger, Ideals Publications, 1995.
- "Animals in Winter" by Henrietta Bancroft and Richard G. Van Gelder, Harper Collins Publishers, 1997.

In *Wildlife in North Carolina:*

- "Do North Carolina Black Bears Hibernate in the Winter?" by Mark Jones, October 2004.
- "Long Summer's Nap" by Jeff Beane, June 2002.
- "Sleepers" by Lawrence S. Earley, November 1988.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's Web site at www.ncwildlife.org.

Make a Hibernating Little Brown Bat Sculpture

This activity may be downloaded at www.ncwildlife.org, the magazine page, and copied for educational purposes.

'Outdoor Nation' Packs Hefty Economic Punch

A recent report released by the Congressional Sportsmen's Foundation demonstrates that by any measure, America's 34 million hunters and anglers are among the most prominent and influential of all demographic groups. Spending more than $76 billion dollars a year on hunting and fishing, America's hunters and anglers would rank in the top 20 list of the Fortune 500. In fact, their spending is greater than the revenues of high-tech giants Microsoft, Google, eBay and Yahoo! combined.

These latest figures demonstrate that season after season, hunters and anglers help drive the economy from big business to rural towns, through booms and recessions. They directly support 1.6 million jobs, which is twice as many jobs as the combined civilian payrolls of the Air Force, Army, Navy and Marine Corps.

"While hunting and fishing are generally thought of as just outdoor traditions, they actually comprise an outdoor nation—both in terms of economic impact, and in turning out the vote on Election Day," said Jeff Crane, president of the Congressional Sportsmen's Foundation. "If the $76 billion dollars sportsmen spend on hunting and fishing was the gross domestic product of a country, sportsmen as a nation would rank 57th out of 181 countries."

MELISSA McGAW/NCWRC

Broken down to a daily spending figure, the economic stimulus of hunting and fishing comes out to an astounding $208 million dollars a day. This spending keeps people working not just in typical hunting and fishing jobs, but also in gas stations, retail, restaurants and hotels throughout every state in the U.S. Government coffers also benefit because spending by sportsmen generates $25 billion dollars in federal, state and local taxes.

"Hunters have an unequaled passion for their outdoor traditions, spending 220 million days in the woods, fields and wetlands each year and nearly $2,000 per person on firearms, ammunition and other equipment and services," said Doug Painter, president of the National Shooting Sports Foundation. "That's $23 billion pumped into the economy, benefiting not only the manufacturers of hunting-related products, but everything from local mom-and-pop businesses to wildlife conservation in every state in America."

And despite rising fuel costs, hunters and anglers spent a total of $1.8 billion on motorboat fuel for hunting and fishing activities.

The report, "Hunting and Fishing: Bright Stars of the American Economy" uses the results from the U.S. Fish and Wildlife Service's 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation and compares hunters' and anglers' impact on the economy with other constituencies.

ON PATROL

In a late duck-shooting case, Officer Jonathan Lucas was escorting his guilty late shooters out of the swamp in near darkness, when he advised one of the hunters "not to step over there," where it looked like there might be a trap set. The duck hunter agreed that it looked like a trap was set, and then acknowledged that it was his trap.

Lucas requested his trapping license and found out that the hunter did not have one. When his traps were pulled, they lacked his name tags, which are required to be on the traps. Then, when he was questioned further, the man did not even have permission to set the traps on that property. Officer Lucas then properly "tagged" him with several citations.

ILLUSTRATED BY JACKIE PITTMAN

River Herring Moratorium Becomes Official

The N.C. Marine Fisheries Commission has finalized a River Herring Fishery Management Plan that will continue a harvest moratorium until river herring stocks show improvement. The plan calls for zero harvest of river herring statewide in coastal waters, except for 7,500 pounds per year set aside for research and to supply some local fish for cultural events.

The moratorium went into effect by proclamation for the 2006–2007 fishing season after the commission tentatively approved the plan last fall. "It was not an easy management decision to make, but one that had to be done to give river herring any chance of recovery," said Louis Daniel, director of the N.C. Division of Marine Fisheries.

The N.C. Wildlife Resources Commission instituted a moratorium on river herring harvest in inland waters in 2006.

River herring fishing in northeastern North Carolina is a long-standing tradition dating back to Colonial times ("Fish of Yesterday, Fish of Tomorrow," Oct. 2007). However, despite increasing regulations designed to help the fishery recover, commercial landings have continued to decline since the mid-1980s. Even with a fishing moratorium, river herring stocks, which are classified as depleted, may not recover within 10 years.

In addition to regulatory measures, the plan calls for intensive monitoring and research of river herring populations. The plan also calls for water quality improvements and the removal of dams and other man-made structures that block river herring migrations.

In its 2007 session, the N.C. General Assembly funded two new positions and operating expenses to implement the plan. The legislature also appropriated $100,000 to the Albemarle-Pamlico National Estuarine Program for river herring research. This money, along with state and nongovernmental partnerships, will begin the process of river herring recovery.

Hatchery Fish Kill Won't Hinder Stocking

Despite a large fish kill at Armstrong State Fish Hatchery in August, the N.C. Wildlife Resources Commission anticipates fulfilling all of its trout stocking requirements for this season.

Too much heat and too little rain killed more than 103,000 brown and rainbow trout being raised at the coldwater fish hatchery located in McDowell County. The majority of these fish were scheduled for stocking in 2008.

However, the agency's other two trout hatcheries, which have not had any substantial fish losses, have produced enough trout so that all stockings for the 2008 stocking season should continue as scheduled. In October, the commission cut the number of trout stocked for delayed harvest waters, but that was because extreme drought had dropped water levels in a number of streams.

"We always build in a buffer to account for some fish mortality, so we plan to move fish among the fish hatcheries in order to make up for fish that we've lost," said Kyle Briggs, fish production coordinator for the commission. "We've also contacted Erwin National Fish Hatchery to get extra trout eggs for this year so that we can grow out and stock waters next summer."

Trout thrive in cold, fast-moving water, so they are sensitive to high water temperatures and low water flows. However, stream-dwelling trout are able to survive poor weather conditions better than trout housed in a hatchery for two reasons: They are found in far lower densities in streams and they can move upstream or downstream where conditions may be more favorable.

"The good news for stream-dwelling trout is that the drought should have no long-lasting impacts on those populations," Briggs said. "It's a different story, however, for trout in a hatchery environment."

In order to keep hatchery-housed trout alive during periods of low-water flow and high temperatures, hatchery personnel add more oxygen to the water and recirculate the water to provide more flow to raceways. Additional oxygen and recirculated water increase the dissolved oxygen in the water, which helps keep fish alive longer.

"Most of the time, these measures are enough to keep the trout alive until conditions improve," Briggs said. "Unfortunately, we have seen the water temperatures in the hatchery steadily rise into the mid-to-upper 70s, and there's not a whole lot we can do under those conditions."

This isn't the first time that commission-owned fish hatcheries have sustained major fish losses due to the weather. In 2004, the Armstrong, Bobby N. Setzer and Marion hatcheries lost more than 100,000 trout after Hurricanes Frances and Ivan caused massive flooding in the mountains. Still, trout stockings the following year remained unaffected.

MELISSA McGAW/NCWRC

Armstrong is one of the commission's three coldwater facilities.

Despite the hot, dry summer, Briggs is cautiously optimistic about the trout stockings for 2008. "There is no question that the drought has had an effect on our hatchery system that it will take time to recover from," Briggs added. "As long as we see a return to normal rainfall and temperatures, we should be able to absorb this loss and continue our operations as planned with no reduction in stocking numbers for the 2008 trout stocking season."

IN SEASON

This month, these seasons are open in North Carolina:

Bear: See *Regulations Digest* for seasons and locations.

Bobcat: Through Feb. 29.

Common Snipe: Through Feb. 28.

Crow: Wednesday, Friday and Saturday of each week through Feb. 29, plus Christmas.

Fox: Through Jan. 1. See *Regulations Digest* for locations.

Grouse: Through Feb. 29.

Mourning Dove: Dec. 17–Jan. 12.

Pheasant: Through Feb. 1.

Rabbit: Through Feb. 29.

Raccoon and Opossum: Through Feb. 29.

Quail: Through Feb. 29.

Squirrel: Gray and red through Jan. 31; fox through Dec. 31 in selected counties.

White-tailed Deer: Eastern: gun season through Jan. 1. Central: Gun season through Jan. 1. Northwestern: Gun season through Dec. 15. Western: Gun season through Dec. 8.

Wild Boar: Dec. 10–Jan. 1 in Cherokee, Clay, Graham, Jackson, Macon and Swain counties. (In the other 94 counties, feral hogs are not considered to be wild boars, and the commission does not regulate them.)

Woodcock: Dec. 14–Jan. 12.

Migratory Waterfowl

Canada Goose: Resident Population season through Dec. 1 and Dec. 15–Jan. 26. Southern James Bay Population through Dec. 31.

Snow, Blue and Ross' Geese: Through March 1.

Tundra Swan: Through Jan. 31 by permit only.

Ducks, Coots, Mergansers and Brant: Through Dec. 1 and Dec. 15–Jan. 26.

Sea Ducks: Through Jan. 31.

There is no closed season or bag limit for groundhog, coyote, striped skunk and nutria, except that nutria may not be shot in Currituck County during open seasons for migratory waterfowl. There is an open season for taking beaver with firearms during any other open season for the taking of wild animals.

Check the *2007–2008 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit www.ncwildlife.org.

Weakfish Limits Reduced Once Again

The N.C. Division of Marine Fisheries has reduced the harvest limits on weakfish for both recreational and commercial fishermen. The recreational creel limit is now six fish per day instead of seven. The size limit will remain at 12 inches.

The commercial bycatch allowance for nondirected fisheries dropped from 300 pounds per day or trip to 150 pounds per day or trip. Commercial landings for 2006 (362,855 pounds) were the lowest on record.

The state is changing the weakfish harvest limits to implement management measures approved by the Atlantic States Marine Fisheries Commission last February. The changes are needed because a 2005 weakfish stock assessment concluded that weakfish populations, which appeared to be recovering in the late 1990s, experienced a sudden decline between 1999 and 2003. Scientists do not believe fishing caused the decline. Instead, evidence suggests there was a significant rise in natural mortality, possibly resulting from insufficient food supply, high predation or other environmental factors. However, projections indicate stock recovery will require a very low total mortality, necessitating stricter controls on fishing.

CALENDAR OF EVENTS

Sunday, December 2

Add to your enjoyment of fishing by attending Fly-Tying for the Beginner at the Pisgah Center for Wildlife Education in Pisgah Forest. Limited to six participants. Equipment and materials provided. Contact (828) 877-4423.

Saturday, December 15

Learn about nature using different senses in the Scratch and Sniff Guided Hike at Chimney Rock Park. The hike will focus on using your sense of smell to learn what plants are edible and which are noxious. Ages 8 and older.
Visit www.chimneyrockpark.com.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to jim.wilson@ncwildlife.org, or call (919) 707-0177.

The Wildlife Endowment Fund

~An Investment for the Future~

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses and lifetime magazine subscriptions is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appraprate block)*:

- ☐ Sportsman Infant $200
  (under 1 year ald—Applicatian must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant. $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Applicatian must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters on game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents anly—includes basic hunting, big game, game lands & N.C. waterfawl)
- ☐ Sportsman $500
  (N.C. residents anly age 12 ar older—includes basic hunting & inland fishing, big game, game lands, traut & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents anly—includes same privileges as the Sportsman, plus caastal recreatianal fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # (____) _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. *(Credit card payments cannot be accepted.)*

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Lifetime Magazine Subscription

☐ Lifetime Magazine Subscription to *Wildlife in North Carolina*. $150
(Please allow up to 6 weeks for your subscription to begin.)

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

MLIFE7

Make checks payable to: *Wildlife Endowment Fund*

A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

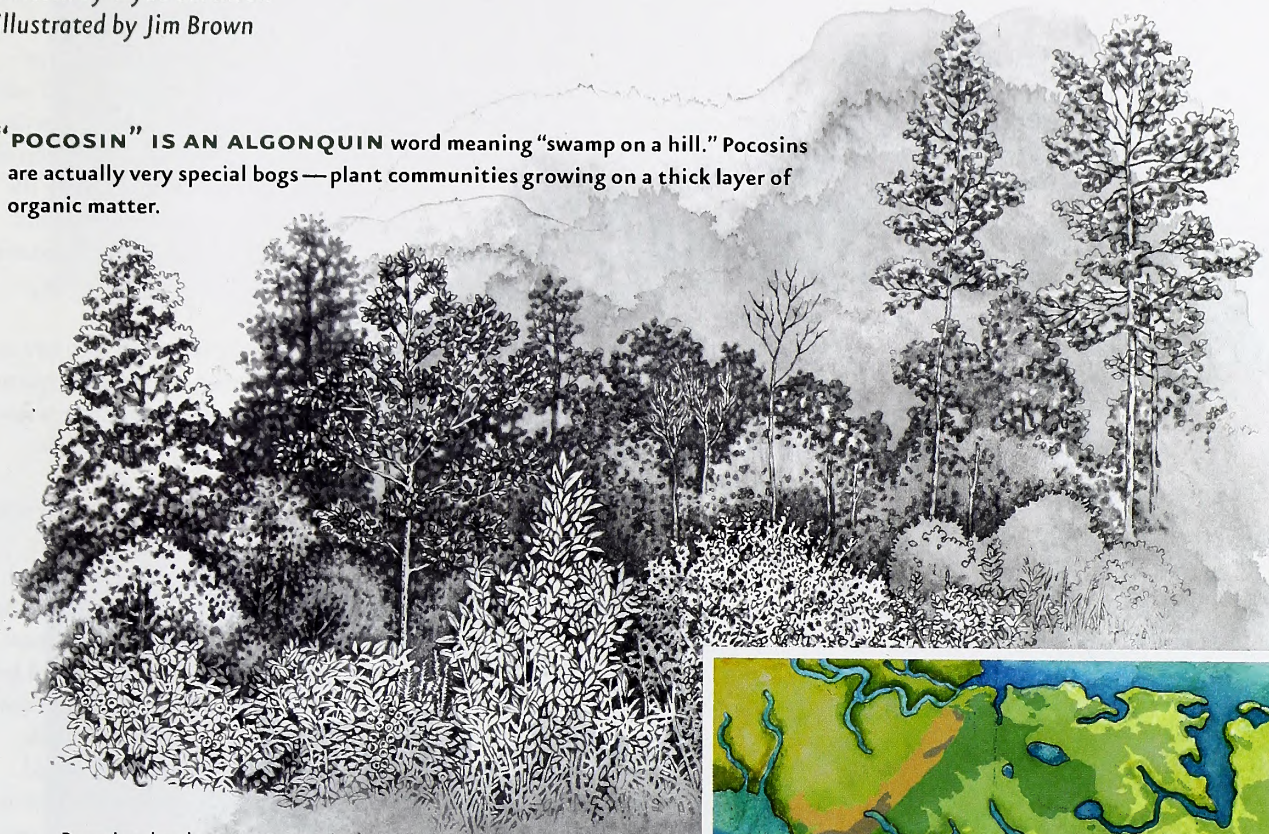
Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

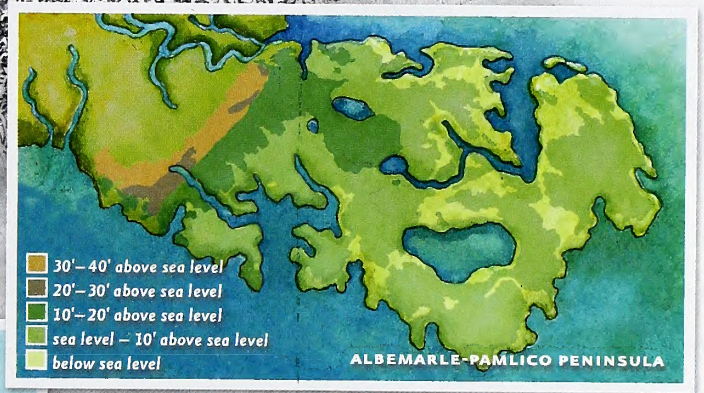
How Do Pocosins Form?

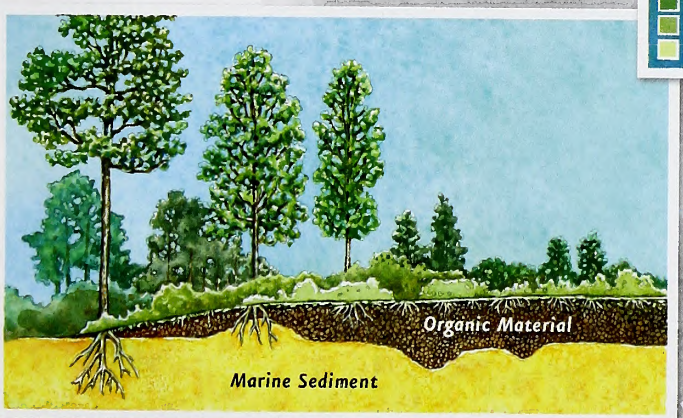
written by Clyde Sorenson
illustrated by Jim Brown

"POCOSIN" IS AN ALGONQUIN word meaning "swamp on a hill." Pocosins are actually very special bogs — plant communities growing on a thick layer of organic matter.



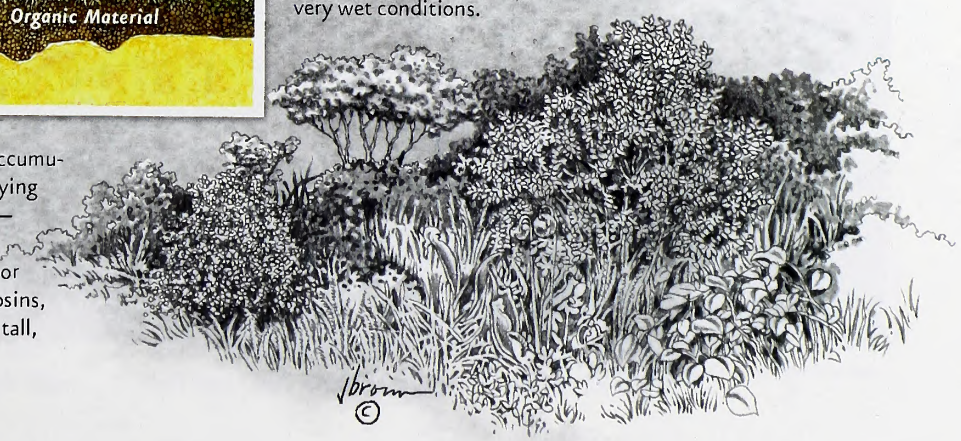
Pocosins develop most extensively in the tidewater regions of North Carolina. The broad plains in this area were formed thousands of years ago when sea level was higher. Wave action and sediment deposition produced vast areas of virtually level ground.





When sea level subsequently dropped, the plains were so flat that water drained off of them to the sounds and sea slowly, through only a few streams. Rainfall was high then, as it is now. Lush vegetation grew with the abundant rainfall and long growing season. But plants dying and falling on these sites tended to decompose very slowly because of the very wet conditions.

Over time, this peaty, water-holding organic matter accumulated to depths that put the mineral soil of the underlying plains out of reach of the shallow roots of the plants — and the site became a shrub bog. Plants growing in this habitat must be adapted to very wet, nutrient-poor conditions. The oldest pocosins may be the "low" pocosins, with evergreen shrub vegetation only a couple of feet tall, where the plant nutrient phosphorus is most rare.



The Gilded Age

written by Jim Dean

The essence of romanticism, lectured my VMI English professor Col. Herbert Nash Dillard, is a love of all things past. He might also have observed that the older we get, the more of the past we accumulate to cherish, and the more apt we are to wallow in it.

JIM DEAN

Certainly that was true a few months ago when I began looking through a pile of old *Field & Stream* magazines published in the late 1950s (left to me by my late fishing buddy Matt Hodgson). In 1958, I was graduating from high school and considering a career of writing about fishing and hunting—with the bemused "This, too, shall pass" support of my family. Having seen these magazines for the first time in nearly 50 years, I was reminded of where that unlikely pipe dream had originated.

Hunting and fishing were still honorable pursuits untainted by political correctness in the '50s, and outdoor journalism was arguably at its peak. Under Hugh Grey's editorial guidance, *Field & Stream* was clearly the cream of the crop, having attracted far and away the best writers. North Carolina's Robert Ruark lovingly depicted his years growing up in Southport while hunting and fishing with his grandfather. These monthly columns were later collected in two sterling volumes, "The Old Man and the Boy" and "The Old Man's Boy Grows Older." Also, Corey Ford was regaling us with the hilarious exploits of "The Lower Forty," and Ed Zern had just begun his back page humor column, "Exit Laughing."

"Hunting and fishing were still honorable pursuits untainted by political correctness in the '50s."

Zern displayed wonderfully sophisticated whimsy, particularly when he famously reviewed a reissue of D. H. Lawrence's 1928 novel "Lady Chatterley's Lover." The book was highly controversial when it was first published because it graphically depicted the erotic liaisons between a bored aristocrat and her lover, a gamekeeper on the estate. Zern's deadpan assessment noted that "this fictional account of the day-to-day life of an English gamekeeper is still of considerable interest to outdoor-minded readers," adding, however, that "Unfortunately, one is obliged to wade through many pages of extraneous material." He dryly concluded, "In this reviewer's opinion, this book cannot take the place of J. R. Miller's 'Praetical Gamekeeping.'" Some, alas, took him seriously.

Older sportsmen fondly recall the superb contributions of fishing editor Al McClane, shooting editor Warren Page, H. G. Tapply (of Tap's Tips) and Ted Trueblood (whom Zern invariably called Ted Truecorpuseles, further venturing that he suspected Ted was a figment of editorial imagination). Trueblood was the consummate outdoorsman and perpetual champion of Dutch oven cookery. McClane was undoubtedly the most widely traveled and experienced angler of his time, and his two major works—"McClane's Standard Fishing Encyclopedia" and another on fish cookery—are still the best of their type.

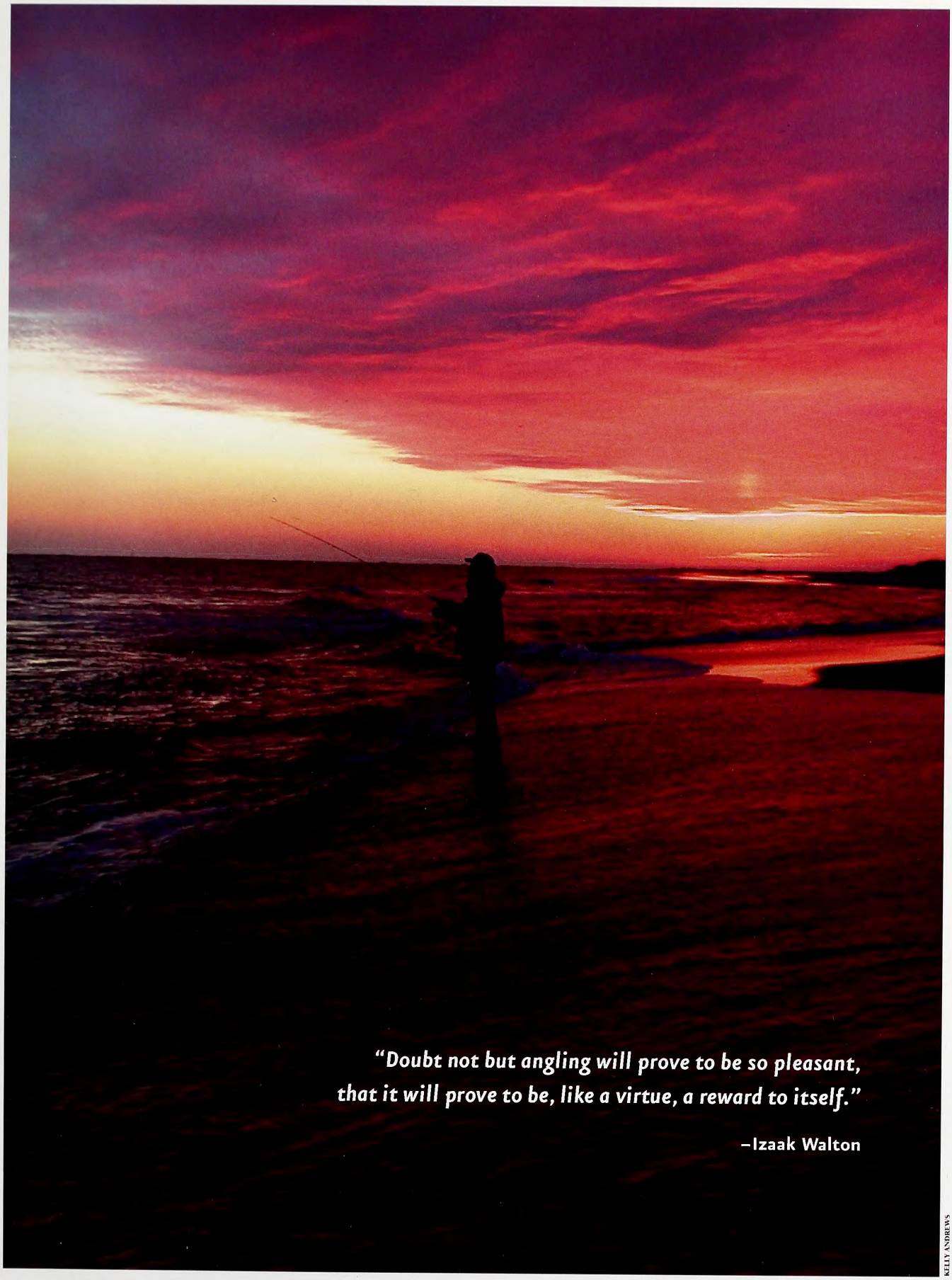
All of these gentlemen are long dead, but they live on in the pages of these old magazines, and in subsequent collections of their work. No outdoor magazine writing staff before or since, in this reviewer's opinion, can remotely compare.

One advantage those writers had was space. Article length ran to 3,500 words or more. Although there were certainly lots of short tips (Tapply's especially), editors and readers were as appreciative of fine writing as they were of useful information. By contrast, most material in modern outdoor magazines is designed for an abysmally short attention span, and seldom accompanied by more than a single money-saving generic photograph. Lots of photos accompanied those old articles, enough to give you the true flavor of a trip or place. Magazine covers were frequently evocative paintings—rather than photos—rendered by exceptional artists, Lynn Bogue Hunt among them.

There are, however, other pleasures to be derived from these old magazines, especially for those of us of a certain age. The 1959 Christmas issue, for example, has advertisements for Belgium-made Browning Auto-5 shotguns for $129.75, Pflueger Supreme casting reels for $37.50, Italian-made switchblades (now illegal) for $4.70, Havilah Babcock's bird-hunting classic "I Don't Want to Shoot an Elephant" for $3.50 and Seal-Dri latex waders for $16.95. (OK, so the waders had issues. I still have a pair somewhere with more hot patches than a "Grapes of Wrath" tire inner tube.)

Each of the "big three" outdoor magazines of the day had its own agenda—so much so that one freelancer noted that if you were writing for them, you had to tailor your offering precisely. "If you shoot a grizzly and want to show readers how to skin it, send the piece to *Sports Afield*. If the grizzly charges and you gun it down at your boot tips, *Outdoor Life* is your mag. If, on the other hand, you had a wonderful hunt, rich in aesthetic rewards (but never saw a grizzly), that article was made to order for *Field & Stream*."

Col. Dillard would understand why so many of us wish this were still true.



KELLY ANDREWS

OUTDOOR MOMENT

Puppy drum fishing at Hatteras Inlet

IN THE JANUARY ISSUE

MICHAEL McCLOY

CAPTURED OUTDOORS
We present the winners of our third annual photo competition, selected from almost 5,500 entries. See lots of great photos in 10 categories.

PUBLIC HEARINGS
January is the month that sportsmen statewide have the opportunity to give feedback to managers of fisheries and wildlife resources.

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